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Report 14 · 2009

Calf welfare in organic herds — planning for the future

Proceedings from an ANIPLAN workshop 30.03 – 01.04.2008

Vonne Lund † and Cecilie M. Mejdell (eds.)

Veterinærinstituttet
National Veterinary Institute

National Veterinary Institute`s Report series · 14 – 2009

Title
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Publisher
National Veterinary Institute · PO Box 750 Sentrum · N-0106 Oslo, Norway

Cover design: Graf AS
Photo frontpage: Britt I. F. Henriksen

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ISSN 1890-3290 elektronic edition

Suggested citation:
Lund V, Mejdell CM (eds.). Calf welfare in organic herds — planning for the future. Proceedings from an ANIPLAN workshop 30.03 – 01.04.2008. National Veterinary Institute`s Report series 14-2009. Oslo: National Veterinary Institute; 2009.

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Editors
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Foreword

These proceedings contain papers based on presentations and discussions at the workshop 'Calf welfare in organic herds – planning for the future' held March 31st to April 1st 2008 in Stange, Norway. The workshop and the proceedings reflect discussions on a broad spectrum of issues related to organic calf welfare assessment and the responsible, caring management of organic calves, primarily in dairy farming.

The proceedings are being published more than a year after the workshop. This is partly due to the great loss we suffered since the workshop in losing Vonne Lund, who was a major driving force in the work and in understanding calf welfare. Vonne also was one of the organisers of this workshop, and she is 'the real editor' of the proceedings: she managed to collect all the papers and have them critically revised in accordance with her typical demand for quality. Vonne was an outstanding animal welfare scientist, insisting in her scientific approach on the special way in which animal welfare is understood in organic livestock farming, the ethics of animal welfare and the way it is practiced both by the individual farmer as well as within a structural framework of advisors, organisations, and other stakeholders. She also had an inspiring, warm and pleasant personality, and we miss her greatly in our project group and in our networks.

Willie Lockeretz, now retired from Tufts University in Boston, is gratefully acknowledged for his revision of content and language of the submitted papers, together with Vonne. This was done in combined efforts and with their typical sense for both the long view and the details. Thanks also to Sigrid Engeland and Hanne Mari Jordsmyr at the National Veterinary Institute for layout and technical help with the final workshop report. Cecilie Mejdell is warmly acknowledged for finalizing the process of having these proceedings published.

The workshop was held in collaboration with the project 'Minimising medicine use in organic dairy herds through animal health and welfare planning', ANIPLAN, which is a CORE-Organic project (Project no. 011716) initiated in June 2007. In the ANIPLAN project we will integrate the results of this workshop into our discussions and recommendations by the end of the project.

The workshop was made possible due to financial support by the Norwegian Research Council.
The organising team from Norway, Vonne Lund, Britt I.F. Henriksen, Berit Hansen and Cecilie Mejdell, made all the practical arrangements and took good care of the logistics related to the workshop.

We wish to thank our hosts at Fokhol Farm in Norway for providing us with a warm and friendly atmosphere, and for tasty organic, home-made food. Fokhol Farm was a perfect venue for the many group and plenary discussions and thus for the further development of the project. We thank Fokhol as well as the farms Alm Østre and Nøttestad for letting us view the farms and assess the calves as part of the workshop activities.

Mette Vaarst
Head of the ANIPLAN-project

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Part F. Workshop participants

Part A. What makes a ”happy organic calf”?

What is a happy organic calf? An ethologist’s view

Anne Marie de Passillé and Jeffrey Rushen, Agriculture and Agri Food Canada, Agassiz, BC, Canada.

Abstract

The newborn organic dairy calf needs to be born in a clean, dry and well bedded calving pen and given high quality colostrum in sufficient quantity within 2 to 6 hrs of birth. The young calf is attracted by heat and will stand or lie under a heat lamp when it is provided. The calf also has a great appetite, and feeding it milk ad libitum is recommended. The milk-fed calf is very motivated to suck, and if it cannot suckle its dam, it is important to offer milk via a teat and let the calf suck after its meal. Special care must be taken at weaning whether weaning off the dam or off milk. Calves do well in small groups where they can do exercise and satisfy their social needs. Calves must be kept in dry and clean environments. This is especially true for organic calves, which must be able to maintain health since antibiotic treatments are to be avoided.

Introduction

To be happy, a young calf, whether organic or otherwise, needs to be healthy, comfortable, and well fed. In this article, we summarise some of the recent research findings that help us better understand the needs of young dairy calves. We look at issues such as where the calf is born, the hygiene of its housing and its milk, the comfort of the housing, whether it can suck for milk and the amount of milk it drinks, and the importance of exercise, of being treated gently, and of having company.

Care at birth: Clean calving pens and supplemental heat

Being free of disease is a prerequisite of being happy. The incidence of disease among dairy calves is high. This is a very important issue for organic dairy farming. Calves should be born in a comfortable, clean, well-bedded pen, where their dam is free to move and change positions easily and where the newborn can be kept clean, free of drafts, and dry. Use of an individual calving pen may reduce the incidence of respiratory disease in calves compared with a group-calving pen (Svensson *et al.* 2003). Cows should not calve in a tie-stall; they need to have space to move and find comfortable positions during labour. Furthermore, adequate surveillance of calving is essential to permit timely intervention when dystocia occurs and to ensure rapid provision of the first colostrum.

Newborn calves also are susceptible to cold. In a recent study, we found that newborn calves show a strong preference for lying and standing under a heat lamp during the first three days of their life (Borderas *et al.*, 2008). Cold temperature has been associated with increased calf mortality (Azzam *et al.* 1993, Svensson *et al.*, 2006), impaired absorption of immunoglobulins from colostrum (Norheim and Simensen, 1985; Olson *et al.*, 1980), and increased pneumonic lung lesions (Reinhold and Elmer, 2002). Heat lamps are commonly used as supplemental heat sources for piglets and chicks and should be provided to all newborn dairy calves and also to calves in very cold weather.

One of the first things a caregiver must do is ensure adequate and timely colostrum intake. The newborn calf does not have a fully functional immune system, and requires immunoglobulin-rich colostrum. Calves that do not receive an adequate intake of good quality colostrum are more prone to getting sick, dying, and having slow growth. Colostrum also contains maternal immune cells (neutrophiles, lymphocytes, macrophages), immune system activators, hormones, growth factors, and antimicrobial agents (lactoferrine, trypsin inhibitor, lysozyme), and is richer in nutrients than milk. A failure of passive transfer of immunity (FPT) as a result of poor colostrum management may occur in 25-40% of calves (USDA, 2002). It is not enough to rely on the dam to provide the colostrum through nursing. Colostrum should be hand-fed even for calves that nurse. Relying solely on normal nursing to ensure colostrum intake, rather than giving supplementary colostrum, almost doubles the chance of severe diarrhoea (Svensson *et al.* 2003).

Almost 1/5 of calves suckling from their dam have been found to have inadequate colostrum intake (Filteau *et al.* 2003). It is recommended that calves should consume at least 4 litres of high quality colostrum within 6 h after birth (Davis and Drackley 1998). However we have found that many calves won't voluntarily consume so much colostrum, especially the smaller calves (Vasseur et al 2008). In these cases is it even more important to ensure high quality of the colostrum (over 50 mg of Ig/ litre). The vigour of the calf has a large effect on the amount of colostrum it will consume (Vasseur et al 2008). In some cases, tube feeding may be required to ensure an adequate intake of colostrum.

Thomas *et al.* (2001) measured the distress response of dairy calves following separation from the dam and found that calves showed little response during the first hours after separation. Instead, response peaked almost 18 h after calves were separated, indicating that this response is due to the calf being hungry. To test this idea, some calves were given almost double the colostrum normally provided; as expected, these calves showed almost no distress response to the separation.

In summary, the timing of the first intake of colostrum is particularly important: the transfer of Ig across the gut is optimal during the first 4 h after birth and declines thereafter to be very low at 12 h after birth. Adequate surveillance of calving, especially during the night, is essential to ensure that colostrum is given early enough. To ensure that the management of colostrum is adequate, the blood Ig levels of the calves can be measured by tacking a blood sample 24 to 48 h after colostrum feeding and testing the blood using special kits that measure blood Ig levels. This is one of the most effective ways of checking the adequacy of colostrum management.

Satisfying calf hunger

Calves are often fed milk at only 10-15% of their body weight. However, when provided milk ad libitum they will drink 8 to 12 litres of whole milk (Figure 1).

Figure1. Calves can be fed milk ad libitum through automated milk feeders (left). These allow good control of how much milk is delivered and flexibility in terms of the size and number of meals. They also allow recording the milk intake of individual calves that are group-housed. A simpler (and cheaper) system is to offer milk in a bucket equipped with a tube feeding into a teat (right). When the calf has access to this inexpensive feeder for 2 h twice a day it will drink around 8 litres or more per day. Being able to drink milk through a teat also allows the calf to satisfy its sucking motivation. Both of these systems allow for a more natural feeding rhythm that is determined by the calf.
Photo: Jeffrey Rushen.

Feeding calves milk ad libitum before weaning is similar to the way the cow feeds its young, i.e. 6-12 litre/day in 5-10 meals per day (Jasper and Weary, 2002; de Passillé *et al.* 2006a). When fed this way, the average Holstein calf will gain over 1 kg per day, and we have not found any evidence of increased illness

such as diarrhoea (Khan *et al.* 2007). This level of feeding is believed to ensure good development and function of the immune system. It is recommended to pasteurise the whole milk fed to calves. This can be done on farm with less expensive equipment today and is recommended especially when disease levels are high. Milk is an excellent environment for bacterial growth, so that hygiene in all aspects of milk feeding is essential.

Feeding calves more milk up to weaning is obviously a good thing. However, weaning off ad libitum milk is not easy for the calf, and a growth check is often observed. Gradually reducing the amount of milk given is necessary (*e.g.* Khan *et al.* 2007). We have found that calves need at least a 10-day period of milk decrease before being taken off milk completely (Sweeney *et al.*, 2008); our first results suggest that weaning at 8 weeks is too early. The organic rule of weaning at 12 weeks seems more appropriate. Remember, a hungry calf is not a happy calf.

How to separate calf from cow when we have a suckling system

In nature, weaning involves both a gradual reduction in milk intake and increasing social independence from the mother, but farmed cattle are often weaned abruptly by separation of the cow and calf. In addition, farmed animals are normally weaned at much younger ages than in the wild, and sometimes face additional stressors such as changes in the social and physical environments. Under these conditions, weaning can result in decreased nutrient intake combined with high levels of distress vocalizations and activity (for review see Weary *et al.*, 2007)

Weaning involves a dietary change, e.g. from milk to a solid diet, as well as stress associated with the rupture of the social bond between the calf and the cow. Some recent research on beef cattle has attempted to reduce the stress of weaning by preventing calves from accessing the dam's teats while allowing continued physical contact between the cow and calf (Price *et al.*, 2003; Haley *et al.*, 2005). This work has shown that calves show little distress when prevented from nursing if they have continued contact with the cow, but calves showed the typically strong behavioural response when simultaneously separated and prevented from nursing (e.g. Haley *et al.* 2005). The work on beef calves also shows that once the calf has had several days without access to the udder, cow and calf can be separated with little distress (Price, 2003; Haley *et al.*, 2005).

Weaning

When calves must be weaned off milk they also suffer distress. Gradual weaning has been shown to be less stressful (Khan *et al.* 2007; Sweany *et al.* 2008). We recommend weaning over at least 10 days, preferably 3 or 4 weeks, with weaning starting as late as possible (later than 8 weeks) since the calf will be more ready to start the transition to solid feed.

In some cases, the availability of an alternative social partner may reduce the calf's response to weaning. In dairy calves, the reduction in growth at weaning from milk is reduced when calves are weaned in pairs compared with individually housed calves (Chua *et al.*, 2002). Although the reasons for this difference were not clear, our experience is that calves respond much less to weaning when group housed.

Satisfying the motivation to suck

Calves are very motivated to suck whenever they taste milk. In fact the taste of milk is one of the factors stimulating sucking behaviour (de Passillé and Rushen 2006b). It makes sense that a calf would continue to want to suck each time it tastes milk as in nature it should try to empty the whole udder of its dam. This ensures that the mother continues to make enough milk to provide the calf with the intake necessary for its survival and growth. Sucking is a very important behaviour for the calf. We have shown that sucking stimulates digestive hormone secretion as well as relaxation in calves (Figure 2 de Passillé *et al.* 1993, Veissier *et al.* 2002). Clearly, sucking is very important for calves, and they are very motivated to perform it. Ensuring that sucking motivation is satisfied is one way of making a calf happy! To satisfy this sucking motivation, we recommend feeding calves by teats and letting calves suck these teats after milk meals.

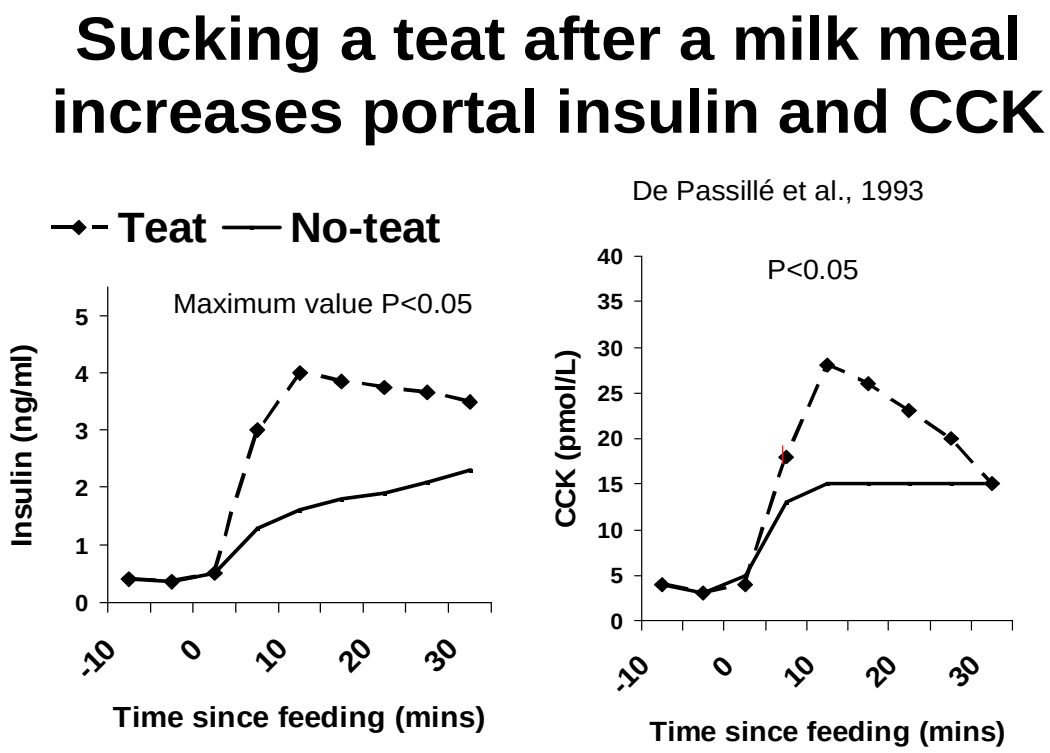

Figure 2. Sucking a teat after a milk meal increases portal CCK and insulin in calves. Redrawn from data presented in de Passille *et al*. 1993.

Allowing the calf to satisfy its sucking motivation and providing it with enough milk to ensure that it is not hungry, is one of the best ways to reduce the amount of cross-sucking or non-nutritive sucking (Figure 3) that can occur when the calf cannot suck for its milk. The occurrence of these behaviours is one sign that the calf is not satisfied with the way that it is being fed.

Figure 3. Allowing the calf to satisfy its sucking motivation and giving it enough milk to satisfy its hunger will reduce the incidence of non-nutritive and cross-sucking. Photo: Jeffrey Rushen.

Satisfying the need for social contact and exercise

A calf also needs opportunities to do enough exercise (through running, jumping, and playing with other calves) to develop its muscles and bones (Figure 4). Play may also help calves develop their social skills (Rushen *et al.* 2008). It is important that sufficient space be provided so that these behaviours can be expressed easily. Usually this is easiest when calves are housed in groups. Farmers have tended to prefer to house calves individually because they believe this helps reduce disease incidence. However, recent studies of commercial farms in a number of countries has shown that mortality and morbidity of unweaned calves can be as low in group housing as in individual housing, provided that the groups are kept small (Losinger and Henrichs 1997; Svensson *et al.* 2003; Svensson *et al.* 2006). The best results are found when groups are kept below 7-10 animals. One study in Finland found the lowest incidence of diarrhoea among calves kept outdoors in small groups (Hänninen *et al.* 2003).

Figure 4. For a young growing animal, the opportunity to play is important to ensure good bone and muscle growth. Social play also probably helps a calf develop its social skills. Photo: Andrea Rogers.

Most growing animals, including young dairy calves, spend much of their time resting (70 to 80% of day) or asleep. Adequate sleep is very important to ensure the welfare of growing calves. Electrophysiological studies (EEG) of young calves show that they spend about 6 hours a day asleep, with about equal amounts of time in rapid eye movement sleep and in quiet sleep. However, their bouts of sleep are quite short, about 5-10 minutes. Usually calves are asleep when their head is resting against the ground or on their bodies and their necks are relaxed (Hänninen *et al.* 2008). We know little about the factors that affect sleep, but, anything that makes it hard for the calves to sleep, e.g., too much disturbance in overcrowded pens, is likely to be a threat to their well-being.

The relationship between the producer and the calf is very important. The development of fear of humans is something we need to avoid to ensure the well-being and productivity of the animals. Calves need to be handled gently with a firm hand; the producer is the boss. This aspect will not be covered here; we review the topic in Rushen *et al.* (2008), *The Welfare of Cattle*. In this book we cover many of the aspects of calf care that we discussed in this paper as well as welfare issues for dairy cows.

Take-home messages:

- Calving and colostrum management must receive special attention, especially for the organic calf as it needs to maintain its health, since antibiotics will not be very available if it gets ill.
- Calves need to drink 8 to 12 litres of clean whole milk per day.
- Calves need to suck during and sometimes after their milk meal. Feeding milk in a teat system satisfies the calves' strong motivation to suck.
- Weaning is stressful and special care must be given when weaning either off the dam or only from milk.
- Sleep and exercise are important for calves, and they need the appropriate environment to satisfy these needs.

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What makes a happy organic calf? An organic veterinarian's view

Mette Vaarst, Faculty of Agricultural Sciences, University of Aarhus, Denmark

The ideas of organic farming in relation to calf health and welfare

IFOAM has formulated a set of basic principles for organic farming, describing how health, ecology, fairness, and care at all levels within the farm and the food production system characterise organic production. These basic principles provide some guidelines for how to integrate the livestock herd and the individual animal into the whole organic farm. Nevertheless, many questions are left for the farmer in managing according to these principles in a given farm context and building them into the daily practices.

Seen from the individual animal's perspective, a good life can be described as a life in good health in living conditions that allow it to behave in accordance with its natural needs, and where it is protected from risks and dangers and yet is challenged and learning to manage its life. Organic livestock farming explicitly emphases the conditions that allow animals to meet their behavioural needs. This involves the provision of a natural environment, and in particular outdoor conditions and a reliance on natural forages. Thinking about this in a farm context, the livestock herd at the same time can achieve good animal welfare whilst satisfying the ecological objectives of organic farming, because Integrating animals (especially more than one species) with crop production can be the basis of a balanced and sustainable farming system, allowing nutrient recycling and effecient resource use.

Letting an animal live a 'natural life', meaning an outdoor life and a herd life, will entail certain risks, especially in a farm environment, where space is limited and the animals do not migrate to other places, but rather stay in the same environment. The calf will be exposed to diseases; compared with the adults, the dairy calf is a vulnerable animal. A newborn or very young animal will always be susceptible to disease, and it will react to infections in a way that demands quick action to avoid letting any disease outbreak become serious for both the individual animal and the herd. Thus there are conflicts, and compromises must be found regarding how to manage access to environments that allow maximum natural behaviour, whilst making sure as a manager that the calves do not become diseased and are given sufficient care. These existing and potential conflicts must be solved in a constructive way, ensuring that the organic farm meets the animal welfare objectives.

Allowing calves 'naturalness' – what does that mean in practice in a farm context?

'Allowing naturalness' does not mean trying to imitate nature. This is impossible and not suitable in the case of dairy cows, which will be in human hands during their whole productive lives. In nature, many risks are present that the calves will suffer from: hunger, thirst, disease, trauma or losing a parent. All these risks should be eliminated in farm life. Therefore, allowing 'naturalness' is partly a matter of analysing the natural needs of a given animal – in this case the dairy calves – and building up an environment that allows them to fulfil their basic behavioural needs. But at the same time we must make very sure that the system minimises the risks and health hazards, creates a positive relationship between the calves and the humans with whom they will have contact in their productive life, and takes good care of them of in case of disease or any other potential causes of reduced welfare.

One important aspect is that newborn animals will be together with their mother in the first part of their lives. Calving will happen in a peaceful place to which the cow has withdrawn, and the calf will be left in the vegetation while its mother is foraging in the area. After a period of time (one week to 12 days) the mother will return to the herd. Since calving in nature often takes place in the spring, there will be several calves in the same age group in the herd. They will play, and over a half year's time will gradually develop their play behaviour into more serious hierarchy-building behaviour. They will suckle their mother regularly, perhaps six times a day, and will learn from the adult animals to seek protection from harsh weather and to seek feed and eat different feedstuffs.

This means that at least the four following elements are important characteristics of the 'natural calf life':

- Mother-calf relations and learning from adults
- Eating forage and roughage
- Living in a herd
- Living an outdoor life

This is very different from how most young dairy calves are reared in northwestern Europe. In our farming environments we often have calvings throughout the year. This brings an instability into the system that is a major challenge to overcome when aiming to give the calves 'naturalness'.

In order to combine the aims of giving animals natural conditions for living a herd life and at the same time eliminating the risks for disease and suffering, the herds must be stable. In creating stable herds, both behavioural needs as well as disease preventing needs are met: The advantages of being in a stable group is the learning element: the calves will gradually move from playing to forming a hierarchy. This can only take place in a proper way if there is not constant introduction of new animals, which would break the stability. By doing this, the risks of constantly introducing disease also are eliminated and the calves can build up common immunity. This, of course, requires enough space to play, to form a hierarchy, and to keep the environment clean and thereby minimise the risk of disease. In this way, the aims of both good health and natural social behaviour are met by the key principle of maintaining stability and enough space in the dairy calf herd, thus ensuring happy organic calves.

With regard to the mother-calf relationship, the role of the human care giver also is clear. Allowing natural behaviour in relation to calving and the first critical feeding (after which the uptake of immunoglobulines will be partially blocked) does not mean leaving the calf and the cow entirely to themselves. It is a responsibility of the human care giver to have the calving take place in a good way with minimum trauma, and to make sure that the calf has sufficient colostrum at its first feeding, with this colostrum fed in as natural way as possible. Suckling gives the best stimulation of both the cow (through release of oxytocine) and the calf (by stimulating the digestive system and immunogloboline uptake). There is a conflict here, because high yielding cows have deep udders that can make it very difficult to suckle. Because of the high yield, the concentration of immunoglobulines in the colostrum is low, which requires a higher uptake of colostrum at the first feeding.

What is the role and responsibility of the human in an organic dairy calf herd consisting of happy organic calves?

Based on these considerations, the role and responsibility of the human towards the calves is, in short, to combine naturalness with specific human care giving in situations calling for intervention. This means that the organic farmer should:

- Build up an environment for the calves that allows maximum natural behaviour and provides the calves with natural feed, promotes health and welfare, and prevents diseases. This also means a stable system where humans monitor and observe the herd and have positive contact with the animals, but do not intervene unless it is necessary because of suffering of some kind.
- Take cake of all animals potentially or actually suffering.

Achieving this requires knowledge of diseases, health, behaviour, and farming systems, with each system analysed and adjusted to meet these needs. It is imperative that organic farmers continue a process where they not only fulfil all legal requirements, but also embrace the underlying principles when developing and managing organic livestock systems, and develop systems in practice that embody the basic organic principles.

Happy Dutch organic calves: Suckling systems in organic dairying in the Netherlands

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Summary

Organic dairy farmers in the Netherlands, supported by the Louis Bolk Institute, developed a calf rearing system in which newborn heifer calves suckle their mother or a nurse cow up to three months of age. Consumers played an important role. Their critical questions made farmers take the initiative to investigate and develop an alternative way (more animal friendly) to raise organic dairy calves. Increased animal welfare and health were the focus of system development, but the practical and economic feasibility of the rearing system also received attention. Farmers implementing a suckling system aim to raise well-developed dairy cows that fit easily into the dairy herd and are adapted to the existing farming conditions. Natural bonding between calves and cows is allowed: calves suckle their mother or nurse mother. The development and implementation of the calf rearing system was followed in three consecutive phases, and aspects of calf health, housing, and milk production were assessed. Suckling of the mother or a nurse cow had a positive effect on the live weight development of the calf. During the process some practical problems had to be solved. However, suckling systems seem a worthwhile contribution to enhance animal welfare in organic dairying.

Introduction

Modern dairy farming is characterised by increasing farm size, high levels of mechanisation, labour efficiency, and strict hygienic rules. Although animal welfare is important, it is sometimes considered to be identical to a combination of good animal health and a good level of production. Specific components of animal welfare, such as the possibility to practice maternal behaviour, social learning, and contact between cow and calf are limited or absent, mainly because they are considered hazardous for animal health or production.

The organic way of producing stands for a more animal friendly and natural approach. However, in organic dairy farming the majority of newborn calves are removed from their mothers within 24 hours after birth. Consumers who are in contact with dairy farms are becoming increasingly critical about this early separation of mother and calf. Some organic farmers also are not satisfied with this situation. They are looking for ways to increase animal welfare in their milking herds and to show consumers the viability of practices that increase animal welfare. To do so, some organic dairy farmers have introduced suckling systems. Besides increased welfare, farmers also anticipate improved technical performance such as faster growth and a higher weaning weight resulting in lower age or higher weight at first calving. Finally, farmers aim for improved animal health. By allowing controlled contact between young stock and older animals, farmers hope that heifers will get increased immunity because the older animals have developed resistance towards a wider range of farm-specific germs, which may be transferred to the young animals.

This article reports on the experiences and findings during the different stages of the development and implementation process of suckling systems on organic farms in The Netherlands.

Materials and methods

The results presented in this paper are based on research and development activities on suckling systems in organic dairy farming in the Netherlands carried out in the period 2002-2008. The research and development activities can be divided into three distinct parts or phases:

1. *On-farm system development*
   For the first phase, two organic farmers who were willing to change their existing calf rearing system into a suckling system were selected. Herd size at both farms was around 70 dairy cows. One farm had a traditional cubicle stable, the other had a deep litter stable. The shaping of the

suckling system, farmers' experiences, data on live weight gain of calves, and mother and calf behaviour were systematically collected and analysed in two consecutive Master of Science (MSc) projects. The focus was on incorporating a suckling system into the existing farm situation and reducing the stress for calf and cow at weaning.
The development of suckling systems and data on live weight gain of calves were also followed on another group of five farms working with suckling systems, although less intensively.

2. *On-farm experimental comparison of calf rearing methods*
Results of the first phase indicated that suckling systems work, but that experimental evidence was required to convince farmers and policy makers. Therefore an on-farm experiment was designed. Because farms were supposed to have at least one year's experience with suckling systems, only eight out of a total of 350 organic dairy farms qualified to be selected as experimental farms. Three rearing methods were compared: bucket feeding of artificial milk; bucket feeding of fresh bulk (tank) milk; and a suckling system. On two farms all three rearing methods were compared; on a third farm only bucket feeding of artificial milk and suckling were compared. Not all farmers were prepared to use single suckling of the mother. Therefore two suckling systems were allowed (see figure 1). Each rearing method on each farm involved six to seven calves. Farmers were trained to conduct part of the observations and measurements. Variables assessed included live weight development, disease incidence, treatments and accidents, and milk production and milk quality of mothers as well as of calves raised in the different rearing systems. The calves' milk consumption was estimated. Preliminary results have been published in Wagenaar and Langhout (2007); final results will be published early in 2009.

3. *Evaluation of technical performance of dairy farms using suckling systems in calf rearing*
In 2007 the Animal Sciences Group of Wageningen University and Research and the Louis Bolk Institute started research on general animal health and disease resistance of organic dairy cows. One hundred thirty organic farms (35% of the total in the Netherlands) enrolled in this research. The farm data and in-depth farm information made available in this research created the opportunity to have a closer look at the performance of farms working with a suckling system. Thirty-two farmers indicated they allowed calves to suckle their mothers or a nurse cow after birth. Out of these 32 farms, 11 were selected for evaluation. They applied a suckling system that allowed calves to suckle for 75 to 105 days after birth. They started using a suckling system before 2005 and provided the researchers access to digital milk records over the period 2004-2006. Different aspects of the technical performance of these 11 farms were evaluated.

A more extensive description of the material and methods of parts (1) and (2) can be found in Wagenaar and Langhout (2007) and of part (3) in Wagenaar and Smolders (2008).

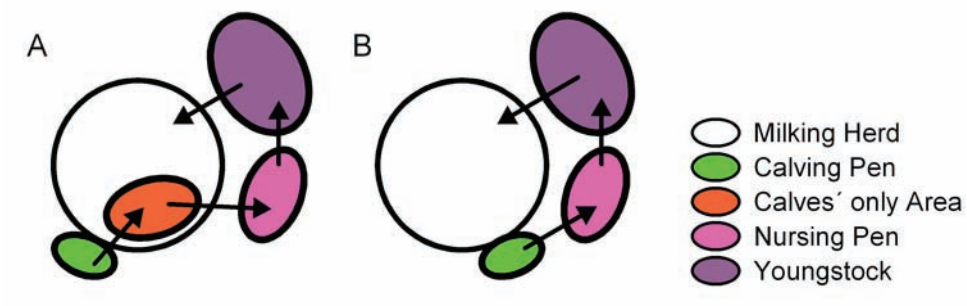

Figure 1. Different suckling systems used in the on-farm experiment; A Single Suckling of mother, B Multiple Suckling of mother, followed by suckling of nurse cow. (Figure made by Jasper van Ruth, JvR architects.)

Results

On-farm system development

In the development of a suckling system, two main aspects were considered. The first was the incorporation of the rearing method within the existing housing facilities and the procedures for milking used at the farm. The second was the development of the calf itself.

Incorporation of a suckling system into existing housing facilities and milking procedures

Both farmers initially started with a system of single suckling of the mother with additional machine milking. However, they experienced that calves moving around freely in the dairy herd led to practical problems. The most important problems were increased activity (unrest) in the herd due to the presence of calves and the separation of cow and calf during machine milking, which prevented cows from letting down their milk. Poor milk letdown was associated with a loss of marketable milk and an increased risk of problems with udder health. The farmers also were critical of the ad libitum milk consumption of calves and calves suckling other cows (aunties), both resulting in less marketable milk. While some of these problems could be partly solved, the farmers could not find complete solutions. After consultation with involved researchers, the farmers moved towards multiple suckling of nurse cows without machine milking. Multiple suckling requires housing space outside the herd, where one to three cows can nurse three to eight calves. Putting more cows and calves together in one group resulted in poor oversight and poor hygienic conditions. Because housing space was limited and expensive, the farmers started to aim for a calving peak in spring – early summer. In this way they could keep nurse cows and calves in an outside paddock, thereby reducing space requirements and also improving hygienic conditions.

Photo 1. Single suckling was successfully implemented in existing housing facilities. Photo: Jos Langhout (LBI)

Development of suckling system in relation to weaning and calf development

The first results of the single suckling system with respect to the development of the calf were encouraging. The farmers did not experience many problems and the calves showed good live weight gain. Age, live weight, housing availability and the possibility of forming groups with other calves of the same age determined the age at which individual calves were weaned. Despite efforts to establish an appropriate weaning practice, many calves showed a low growth rate from weaning to one month after weaning. Separation at weaning resulted in vocalisations by cow and calf. These could last up to three days with varying intensity. Farmers tried to divert stress after weaning. They placed the calf pen close to the milking herd in such a way that the mother and calf could still see each other and/or have limited

physical contact through a fence. In some cases, space availability inside the milk barn limited optimal calf pen arrangement.

In 20% of the cases involving separating mother and calf, stress was successfully reduced. However, in most cases the calf, mother or both did not respond to the measures taken to avoid stress after weaning. As a result the calves and some mothers were disturbed and restless up to 72 hours after separation. Calves expressed their unhappiness by frequent and loud vocalisations. The farmers, but also neighbours, experienced the frequent and loud vocalisations after weaning as disturbing. This made them change from a single suckling system to a multiple suckling system. Multiple suckling implied a more gradual weaning (more calves per cow – less milk per calf) and offered farmers better oversight and control.

On-farm experimental comparison of calf rearing methods

Three calf rearing methods were tested on three different farms. Calves reared in a single suckling system gained weight very fast. More than 1 kg of weight gain per calf per day was possible. Figure 2 shows the average live weight development of calves raised with different rearing methods. Average weight at weaning (90 days) was 136 kg, 101 kg and 95 kg for the groups getting suckling, bucket-fed tank milk, and bucket-fed artificial milk, respectively. The average pre-weaning growth rate of suckled calves was 1.080 kg/day vs. 0.658 kg/ day when bucket-fed on tank milk and 0.630 kg per day when fed on milk replacer. Rearing method ($P < 0.001$) and farm ($P < 0.01$) had a statistically significant effect on pre-weaning growth and live weight at 90 days of age, but not on weight gain between 90 and 365 days. The live weights at 365 days were 343, 316 and 288 kg for suckling, bucket-fed tank milk and bucket-fed milk replacer groups, respectively, which differed significantly ($P < 0.01$). This shows that the higher average live weight of the suckling group at weaning was sustained at least until the age of one year. Calves on the experimental farms did not suffer from any major health problems and the farmers did not encounter major practical constraints.

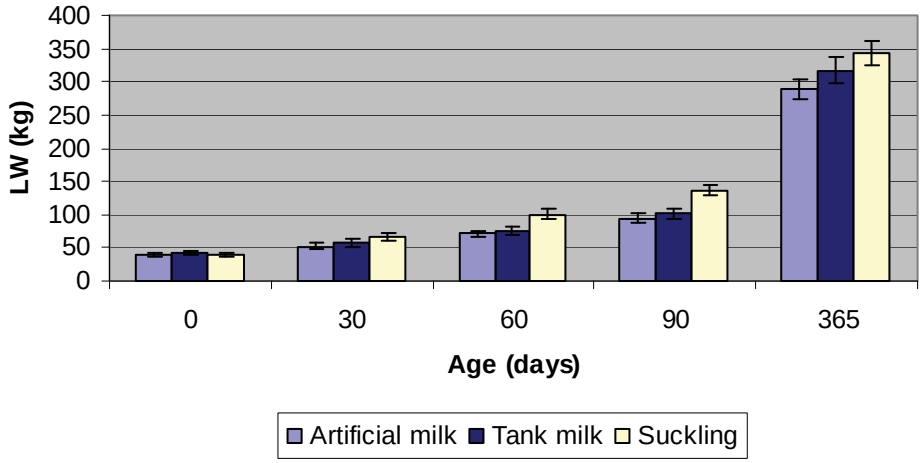

Figure 2. Live weight development of different rearing groups (adapted from Wagenaar and Langhout, 2007); average live weight (kg) plus/minus standard deviation (kg)

Evaluation of implementation of suckling systems on operational dairy farms

In 2007 a start was made to evaluate farms working with a suckling system in calf rearing. This work is ongoing and a more complete analysis will become available in 2009. Preliminary results indicate that there are no big differences between organic dairy farms that apply suckling systems in calf rearing and those that do not. Farm size was comparable; in both groups the main breed was Holstein Frisian (75%). This was followed by Blaarkop (7%) in the 'suckling' group and by Meuse-Rhine-Yssel cattle (MRY; 7%) in the 'other' group . In table 1 the average annual milk production in the period 2004-2006 is presented. A difference was found between the milk yield of 'suckling' farms (n=11) and 'other' farms (n=88). Because most suckling farms use nurse cows in suckling, the difference could not be explained by milk consumption of the calves. It was found that cows on farms that implemented suckling systems had a lower production

level. The major reason seemed to be that farmers working with a suckling system had an alternative management approach, e.g. they reduced their use of antibiotics, excluded maize silage from the ration, and had low concentrate purchases compared with the other group of farmers.

Table 1. Average annual production in different types of herds 2004-2006: milk yield, fat and protein content (adapted from Wagenaar and Smolders 2008)

Farm type	No. of cows	Days of lactation	kg milk	kg FPCM[1]	% fat	% protein
Suckling	1301	399	6534	6481	4.44	3.53
Other	10989	351	7479	7146	4.36	3.43

[1]*Fat and Protein Corrected Milk production*

Discussion and conclusion

Farmers successfully develop and establish suckling systems. Even in a modern production system with an automated milking system (robotic milking), farmers are convinced that suckling in calf rearing adds something extra to the development of calves. Initial live weight gains of suckling calves are high. The downsides are the loss of marketable milk because of milk consumption by the calf, and stress around weaning. Although milk consumption by the calf is often considered a negative aspect, it can also be regarded as an investment in growth and development of a future dairy cow.

There is no golden formula for how to apply a suckling system; every farm has developed its own system. Single suckling of the mother is rarely practiced; most farmers go for a system with nurse cows. Weaning remains a point of concern; it causes distress for the calf, cow, and farmer. Even two-step weaning (single suckling mother for one or two months in combination with multiple suckling of nurse cow for two or one month) does not completely solves stress around weaning. To some extent 'unrest' around weaning is unavoidable, because suckling creates a bond between the (nurse) mother and calf. During five years of research, no serious health problems that could possibly be related to suckling were encountered on farms where suckling was practiced.
Suckling systems are an option to increase animal welfare and thus to further distinguish organic from conventional dairy farming. However, the decision to adopt a suckling system cannot be forced, but should be made by the farmers themselves. In order to evaluate the benefits of suckling systems in terms of animal welfare there is a need for observable and objective variables for calves and the dairy herd in general.

Introducing suckling systems in calf rearing has many implications for a dairy farm operation. Therefore the majority of organic farmers, although they are sympathetic towards welfare benefits of suckling systems, are hesitant to adopt suckling systems. Only 'organic-by-heart' farmers who have been prepared to radically change their approach to calf rearing, delegate part of their caretaking responsibilities to (nurse) cows, and persevere in fine-tuning the new rearing approach towards their farm-specific needs in a number of consecutive steps have been able to successfully implement a suckling system on their farms. Farmers who do not consider suckling in calf rearing are advised to look at other ways to improve calf and herd welfare, e.g., making sure that housing and climate are optimal and functional, that their animals are fed according to their requirements, and that they are given opportunities for social learning (for example, introducing heifers into the milking herd two months before calving).

On-farm research and development of suckling systems requires intensive follow-up, perseverance, and flexibility. In the development phase farmers start off with their ideal suckling system; however, based on how their animals react and practicality in general, the ideal system is continuously adjusted. It is important to keep track of even minor adjustments and reasons that they should be made, or whether the farmer should be patient to see the full effect of the chosen approach. Farmers also can abruptly change their approach, for example due to increasing somatic cell counts in the marketable milk. Although single suckling of the mother is preferred in terms of animal welfare, stress after weaning made farmers move

away from this practice very quickly. In the experimental phase, farmers cooperated in an excellent way by measuring the live weight of individual calves at specific dates and recording health events and behavioural aspects and taking milk samples. However, farmers cannot be expected to follow strict experimental protocols, embedded in an ongoing farming operation, for a longer period of time, even if they are given a financial reward. To measure the effect of suckling in calf rearing on future dairy cows, the animals have to be followed at least through their first lactation and preferably longer. Researchers and farmers have to settle on a feasible research set-up and data collection frequency. The final outcome can be rewarding: on-farm research and development of suckling systems generated many ideas, experiences, and valuable quantitative results.

Acknowledgements

We would like to thank the farmers who participated in our research and for the funding provided by the Triodos Bank, the Province of North-Holland, and the Dutch Ministry of Agriculture, Nature and Food quality, the Integrated Project QUALITYLOWINPUTFOOD, FP6-FOOD-CT-2003- 506358 by the European Community under the Sixth Framework Programme for Research, Technological Development and Demonstration Activities.

Photo 2. Suckling system during pasturing: added value!
Photo: Jos Langhout (LBI)

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Part B. Calf welfare assessment in organic herds

Welfare assessment of dairy calves in the Welfare Quality® project

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Summary

The Welfare Quality® project aims at developing robust and scientifically sound on-farm welfare assessment systems for different species. The monitoring systems emphasise the animal's point of view by placing great importance on animal-based measures. These include the occurrence of spontaneously performed behaviours, behavioural tests, and a set of clinical variables. A limited number of resource- and management-based measures have also been included where applicable. Two age categories of calves (birth to weaning and from weaning to 6 months) are considered in the welfare monitoring system for dairy calves. The proposed system is thought to complement the system developed for dairy cows, thus allowing it to reflect the whole life span of dairy cattle.

Introduction

Rearing conditions for dairy calves can vary widely within this period and among farms. For example, calves can be kept individually or group housed, with access to pasture in some cases. These different rearing conditions and differences in farm management may affect animal welfare. Welfare problems become obvious in the form of high disease incidences and losses during the milk feeding period or the development of abnormal behaviours such as intersucking (Scientific Veterinary Committee, 1995).

With few exceptions (Whay *et al.*, 2003), most attempts to develop operational on-farm assessment protocols for dairy cattle (e.g., Capdeville and Veissier, 2001) have focussed on dairy cows only, thus leaving out a considerable part of the animals' life. However, the calf and heifer rearing period is important from the consumer's point of view. Also, identification of welfare problems during rearing not only allows the situation in these stages to be improved by providing feedback to the farmer. It may also improve the welfare of dairy cows by reducing carry-over effects from the rearing period, for example regarding intersucking (Keil *et al.*, 2001).

The Welfare Quality® project aims at integrating farm animal welfare into the food chain by addressing society's expectations and market demands, and developing robust and scientifically sound on-farm welfare assessment systems for different species, including cattle. Based on the research work during earlier stages of the project regarding validity, reliability and feasibility of assessment protocols, the assessment protocols for dairy calves follow the 'Principles of Good Welfare' developed by Welfare Quality®: good housing, good feeding, good health, and appropriate behaviour. Within these principles, distinct but complementary animal welfare criteria were highlighted (see also table 1). The full on-farm monitoring systems emphasise the animal's point of view by placing great importance on animal-based measures. However, environmental and/or management-related measures have also been included where applicable, i.e., if no feasible animal-based measure was available.

Criteria and measures for the assessment of calf welfare

General layout

The different measures of the prototype welfare assessment system are listed in Table 1 according to the welfare principles and criteria. The system applies to dairy calves up to 6 months and is based on the already existing protocols for veal calves and beef bulls within Welfare Quality® (http://www.welfarequality.net/everyone/34056/41398) as well as other studies focussing on calf welfare (e.g. Vasseur *et al.*, 2007).

Two age categories were defined (Cat. 1: birth until weaning, Cat. 2: weaning until 6 months) in order to detect age-specific problems. Furthermore, not all measures were applicable to all developmental stages (e.g. milk feeding strategy) or for feasibility reasons. For example, the approach test to determine calves' responsiveness to humans as proposed by Lensink *et al.* (2003) is performed during milk feeding and would be difficult to harmonise with the farm routines. Also, it cannot be carried out with some feeding systems, such as computer controlled milk feeders.

Table 1. Principles, criteria and measures used for on-farm welfare assessment of dairy calves up to age 6 months in the Welfare Quality® project

Principle	Criteria	Category 1: Birth – Weaning	Category 2: Weaning – 6 months[a]
Good feeding	Absence of prolonged hunger	*Feeding management*[b]	Body condition score
	Absence of prolonged thirst	*Water supply*	*Water supply*
Good housing	Comfort around resting	Cleanliness	Cleanliness
	Ease of movement	Incidence of falling	Incidence of falling
Good health	Absence of injuries	Alterations of the integument Lameness	Alterations of the integument Lameness
	Absence of diseases	Clinical examination (coughing, sneezing, nasal discharge, ocular discharge, increased respiratory rate, ear infections, bloated rumen, diarrhoea, umbilical infection) Mortality	Clinical examination (coughing, sneezing, nasal discharge, ocular discharge, increased respiratory rate, ear infections, bloated rumen, diarrhoea, umbilical infection) Mortality
	Absence of pain induced by management procedures	*Disbudding (if and how)*	-
Appropriate behaviour	Expression of social behaviours	-	Incidence of agonistic and cohesive behaviours
	Expression of other behaviours	Abnormal behaviours Play behaviour Qualitative behaviour assessment	Abnormal behaviours Play behaviour Qualitative behaviour assessment
	Human-animal relationship	-	Avoidance distance at the feed rack
	Absence of general fear	-	-

[a] this category comprises all completely weaned animals and animals older than 3 months even if they still receive milk
[b] resource-based or management-based measures in italics

Data collection

In practice, the protocol consists of five blocks that are briefly explained in chronological order below. The time schedule of the protocol is based on the time for morning feeding of the heifers in order to have comparable activity levels and therefore similar conditions on the different farms. This is necessary, since the activity level and accordingly also social behaviour are likely to be affected by the delivery of feed. Clinical scoring as well as avoidance distance recording is done with a sample of individual animals, the sample size being dependent on the number of calves.

1. Avoidance distance at the feeding place (Cat. 2 only)
For this test, the observer approaches individual animals standing at the feeding place, with one arm at an angle of 45° in front of the body. Starting from a distance of 2 m the animal is approached at a speed of 1 step per second until it withdraws (stepping back or turning the head more than 45°) or until touching. The distance between the experimenter's hand and the muzzle is estimated in steps of 10 cm at the moment of withdrawal from the human (Waiblinger *et al.*, 2003).

2. Qualitative Behaviour Assessment (one assessment for both categories)
Qualitative behaviour assessment integrates all perceived details of behaviour, posture and context into descriptions of an animal's expressive style of behaving, or 'body language' using descriptors such as 'calm', 'sociable' or 'confident' (Wemelsfelder and Lawrence, 2001). The method was initially based on Free Choice Profiling, which asks observers to develop their own descriptive terminologies. Because this is unsuitable for on-farm application, rating scales each presenting 20 descriptors of cattle body language (e.g. irritable, content) have been developed for the Welfare Quality® project (Wemelsfelder *et al.*, 2008). The animals are observed in groups (pens) at a maximum of six observation points for a total of 15 min. Having completed observations, assessors provide scores on undivided visual analogue rating scales.

3. Behavioural observations (both categories)
Behaviour is observed using continuous behaviour sampling in groups of animals for a net observation time of 2 h. The behaviours included are agonistic and cohesive interactions (displacements, head butts, fighting, chasing, chasing up, social licking, horning), abnormal behaviour (tongue rolling, intersucking, urine/prepuce sucking, object licking), injurious behaviour (falling), and play behaviour (locomotory play, mounting). In the course of the behaviour observations, the incidence of sneezing and coughing (used as health indicators) also is recorded.

4. Clinical scoring (both categories)
Body condition (adapted from Lowman, 1973), cleanliness (scored dirty, if more than 20% of one side of the body is covered with plaques of dirt), alterations of the integument (hairless spots and lesions/swellings larger than 2 cm in diameter) and a number of signs of clinical disease (diarrhoea, respiratory disorders etc.) are assessed in individual animals. Scoring should be done from a distance not greater than 2 m from within or outside the pen. Further information on disease status such as mortality is gained from herd records.

5. Resources checklist and management questionnaire
Relevant measures have been included, both resource-based (e.g., number and type of water points, access to an outdoor run) and management-based (e.g. dehorning practices, colostrum feeding, mortality). These measures will be used for assessment purposes when feasible animal-based measures are not available. Additional information on the housing environment and management procedures on the farm also makes it possible to identify causes of poor welfare and to advise farmers on possible improvements.

Practical experiences with the monitoring system

For the organisation of the farm visit, basic information such as timing of farm routines (milking, feeding, etc.) is needed in advance. This information is usually obtained when the farmer is first contacted. The farm visits start by giving an overview of the assessment system to the farmer, checking the availability of the farmer for an interview, and getting familiar with the facilities and animals in the different categories. The animal- and resource-based measures listed in Table 1 are then collected. Assistance by the farmer is not needed for these stages of the protocol. Usually at the end of the visit, the questionnaire-guided interview with the farmer (focussing on management aspects) takes place.

In a pilot study within the Welfare Quality® project, 60 farms in Austria and Germany have been assessed so far. On average, recording of the animal-based measures took 5.2 h (n=33 farms). Another 1.75 h was spent with the resources checklist and management questionnaire. Regarding the latter, however, it has to be taken into account that very detailed information on the farms was collected which by far exceeded the requirements of the welfare assessment system. Data obtained are currently being analysed.

Conclusion

The prototype welfare monitoring system for dairy calves can be regarded as a first step towards a standardized and comprehensive assessment and product information system. It is thought to be complementary to the system developed for dairy cows together with an assessment protocol for heifers, which has not been covered in this paper. From this, a complete model can be developed for the whole life span of dairy cattle.

Acknowledgements

The welfare assessment system presented has been developed within the Welfare Quality® research project which has been co-financed by the European Commission, within the 6th Framework Programme, contract No. FOOD-CT-2004-506508. The text represents the authors' views and does not necessarily represent a position of the Commission, which will not be liable for the use made of such information.

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Experiences from Nordic projects dealing with calf welfare assessment

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Introduction

One of the most important aims in organic animal husbandry is to ensure high animal welfare with respect for the animals' natural needs. Several surveys have shown that animal welfare also is important to consumers of organic animal products. Thus, there are several reasons to assess animal welfare in organic herds: as an aid to the farmer in evaluating the welfare status of his/her herd; as an advisory tool and/or as part of the organic certification process; and as information to the consumer regarding the 'welfare quality' of animal products. In the Nordic countries different welfare assessment systems for dairy production have been developed for these purposes, or as a research tool. However, only a few of these have developed calf welfare assessment schemes. In this paper three calf welfare assessment tools are presented, from Denmark, Norway and Sweden respectively.

Denmark: Calf-life 100

The first calf welfare assessment tool developed in the Nordic countries was the 'Calf-life 100' in Denmark (Vaarst and Nissen 2003). It has been used as a public advisory tool for Danish organic farmers since 2004. The tool was developed in the project 'Health and welfare for organic calves' (HEWDAICA), in cooperation between Research Centre Foulum (now Aarhus University, Faculty of Agricultural Sciences) and the Danish Organic Association (Økologisk landsforening). It was based on and inspired by other welfare assessment tools, such as the Animal Needs Index (ANI, or, in the original German, Tier-Gerechtheits-Index, TGI) (Bartussek, 1995) and the Ethical Account (Sørensen and Sandøe, 1993), as well as Danish recommendations regarding housing for cattle and available heard health registrations. The project period was 2000–2005, and the guidelines for 'Calf-life 100' were published in December 2003. The tool aims to help the farmer evaluate calf welfare and consider changes and improvements that also fit the farm's strategy, thus providing help in making decisions and setting goals.

'Calf-life 100' covers calves 0-6 months old. The whole procedure may be accomplished within 1.5 hours, and deals with three main themes: naturalness, human care, and the calf's response. 'Naturalness' deals with 'natural' living conditions, for example access to daylight, fresh air, and free range husbandry, freedom of choice, social contact, and the calf's possibility to suckle its mother. 'Care' includes human attention and care, but also intervention when necessary and of relevance. 'Calf's response' includes animal-based parameters such as body condition, injuries, skin condition, diseases, and response to strangers. The assessment does not include behavioural observations. These are often quite time-consuming and thus difficult to fit into the 1.5 hour visit. The animals are divided into five age groups/time periods:
1) from 14 days before calving until separation of cow and calf,
2) calves in single boxes,
3) group-housed calves with milk feeding,
4) weaned group-housed calves, and
5) calves on pasture.

It is recommended to have the assessment performed by an outsider – the veterinarian, farm advisor or a colleague. A total of about 125 variables are included in the assessment scheme (in spite of its name!); 25 of these are based on interviews with the farmer. Each variable is given a score. Maximum score varies among variables, depending on how important each variable is considered to be for animal welfare. In the end, the scores are weighted and presented as one overall score, plus separate overall scores for naturalness, care, and calf response. Results from the different sections of the assessment are presented

graphically in spider web diagrams and bar graphs (figure 1). The tool is used in the Danish organic advisory service as a basis for dialogue and discussions with the farmer.

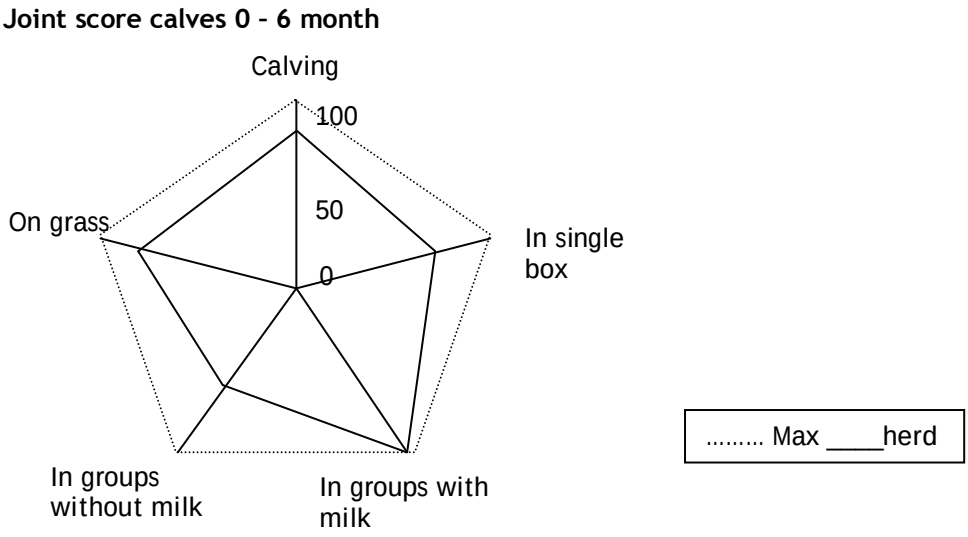

Figure 1. A joint score for different sections of the assessment. A maximum welfare score is in the outer line in the web diagram. Minimum welfare score is zero, and in the middle of the diagram.

Norway: Organic Cow-Comfort

Inspired by 'Calf-life 100' and other welfare assessment systems for dairy cows, 'Organic Cow-Comfort' was developed in Norway in the project 'Good animal health and welfare in organic dairy production' (Henriksen *et al.* 2005; Henriksen *et al.* 2006), funded by the Norwegian Agricultural Authority. It was carried out in 2003–2005 as a joint project of the Norwegian School of Veterinary Science (NVH), the advisory service of the Norwegian dairy company TINE, and the Norwegian Centre for Organic Agriculture (in 2006 renamed Bioforsk Organic Food and Farming Division). 'Organic Cow-Comfort' is an advisory tool developed for organic dairy farmers, but so far has been used only in research. It includes the welfare assessment of cows, heifers, bulls, young stock, and calves. The entire assessment takes about three hours for two advisors to carry out. Some of the registrations are done during milking and feeding, thus the assessment must be done at milking time. The calf checklist includes both animal-based and resource-based parameters. To get an impression of the human-animal relationship in the herd two such tests are also included.

'Organic Cow-Comfort' presupposes a minimum of two visits to the farm, the first in winter and a follow-up visit in summer. The advisors; a feeding expert and a veterinarian, also use the visits to discuss with and counsel the farmer. After the first visit a report from the assessment and a welfare plan are written and sent to the farmer. The report summarizes the welfare assessment, including positive welfare issues observed on the farm. The welfare plan indicates what needs to be changed immediately, and also gives recommendations regarding what should be changed over time. Aspects which the farmer has chosen to focus on are also included in the plan. It is revised after every farm visit. In addition to the welfare assessment the advisory tool includes discussion meetings in farmer groups.

Variables are scored using three categories: 'good', indicating that no action is necessary; 'ok', meaning that action is necessary over time; or 'bad', implying that measures must be taken immediately. Some of the results can be presented in bar graphs allowing comparisons among farms (Figure 2), but the scoring system is mainly intended as an aid in discussions with the farmer.

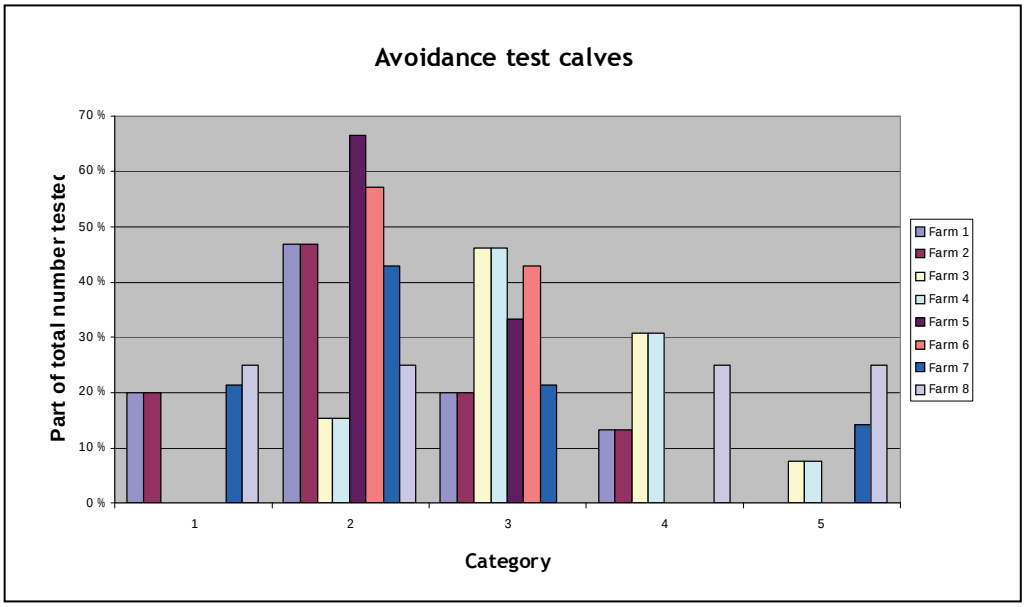

Figure 2. Avoidance test of calves on eight different farms. The X-axis shows the different categories 1 – 5 in the test. 1 indicates the most fearful calves that withdraw when a test person gets in front of the pen. Category 5 represents the most confident calves that accept being touched by the test person. The Y-axis shows the percentage of animals tested (Henriksen et al. 2008).

Sweden: Assessment System for Animal Welfare

A Swedish project has developed an animal welfare assessment system for dairy production, not only for organic herds, based on welfare variables registered in the national animal health recordings (Hallén Sandgren, 2006; Lindberg *et al.*, 2008). The aim of the project was to identify 5-10 variables that among them provide representative information about the welfare of the herd. The system includes welfare assessment of cows, calves, and young stock, and the documentation can be used as the basis for further problem analysis. In the project three hypotheses were tested in four different studies:
A. Animal welfare in a dairy herd can be assessed through national recording data.
B. The assessment system can be communicated with the dairy farmer in such a way that it results in improved animal welfare.
C. The assessment system is positively correlated with the financial results of the production.

The first study included welfare assessment in 62 dairy farms to establish the 'state of the art'. The assessment was carried out by eight advisors, both animal husbandry advisors and veterinarians, in March 2005 – Jan. 2007. The second study focused on how and to what degree the classification of animal welfare in the first study can be explained by data in the national heard health recordings. Promising data recordings, which may be included in welfare assessment, were related to reproduction, mortality in all age groups, number of disease treatments, particularly regarding mastitis, and metabolic diseases. The third study focused on farmers' reactions to the assessment results. The farmers mainly agreed with the results, and were generally positive regarding the project. Body condition, flight distance, and cleanliness were seen as the most important variables to measure. The farmers also asked for a thorough introduction and for counseling in connection to the welfare assessment. The fourth study analyzed different welfare variables' influence on the farm's financial results. Considerable correlations were found between important income and expenditure items and welfare variables such as bulk milk somatic cell count, mortality, fertility, disease treatments, deviating urea levels, and milk yield. Breed significantly influenced a large number of welfare indicators, particularly within the areas of fertility, udder health, and calf and cow survival, all in favour of the Swedish Red and White compared with the Swedish Holstein breed.

The welfare assessment for calves (0-6 month) and young stock (6-24 months) took approximately one hour, and the total assessment took two hours. To achieve this, representative animals were randomly selected for closer scrutiny and a user-friendly protocol based on tick-boxes was developed. Individual observations of cleanliness, body condition, fur, injuries and signs of diseases (diarrhea, respiration, etc.)

are supplemented with group observations and registration of variables such as inter-suckling and coughing. The study found that cow cleanliness (which varied greatly among farms) showed good correlation with several other welfare variables in calves, young stock and cows. Variables particularly promising for welfare assessment were body condition, cleanliness, lameness, injuries, and rising behaviour. Project results indicate that larger herds might have a greater need for continuous screening of welfare status.

The results from the project are now integrated into extension services to safeguard the welfare of Swedish dairy herds.

ANIPLAN-calf

In the Cow-Comfort project it became obvious that the participating farmers demanded more focus on calf welfare in organic dairy herds. Therefore the Norwegian participants in the ANIPLAN project decided to focus on this. Since research in recent years has produced new knowledge of calf welfare as well as of welfare assessment (especially after the development of 'Calf-life 100' and 'Organic Cow-Comfort' took place), a new protocol for calf welfare assessment in organic herds will be developed as part of the ANIPLAN project, with special reference to Norwegian conditions. This protocol will be based on the experiences and knowledge obtained from the three assessment systems presented in this paper, as well as input from a Norwegian reference group. The aim is to produce a protocol that will inform the farmer of the welfare status of his/her herd and thus function as the basis for improvements and advisory discussions with the farmer. The protocol will explicitly aim at organic herds, including the organic principles (IFOAM 2006) and evaluation of system 'naturalness'. The entire assessment should take no more than two hours.

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Calf Husbandry and Welfare on British Organic and Non-organic Dairy Farms

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Summary

As part of a larger study, we aimed to investigate differences between organic and non-organic farms in calving and calf management practices. Forty organic and 40 non-organic farms throughout the UK were visited. Farms were paired on a number of housing and herd criteria. A detailed questionnaire covering key aspects of management during calving was carried out with each farmer. A second postal questionnaire on calf husbandry was sent to each farmer. On a subset of 20 pairs of farms, all dry cows were scored for body condition. Calving management practices and calf husbandry varied greatly within farm type, and there was substantial overlap between organic and non-organic farms. Organic heifers were served and subsequently calved at an older age than non-organic heifers ($P<0.05$). Farmers on organic farmers did not use milk replacers to feed calves, compared to 40% of the non-organic farmers. Organic calves were weaned from milk at an older age than non-organic calves ($P<0.01$). There were few differences between organic and non-organic farms in calving practices and calf husbandry. However, heifer-age at first calving and prolonged milk feeding of calves as seen on organic farms may be beneficial for calf welfare

Introduction

In recent years there has been an increase in the number of dairy farms converting to organic status in the UK. Although there have been some comparison studies investigating health and welfare differences and similarities between dairy cows on organic and non-organic farms (Hardeng and Edge, 2001; Sato *et al.* 2005) there has been less research of this kind specifically based on dairy calves. Potential areas of difference lie in the age of separation of the calf from its dam. In non-organic dairying it is usual to separate the calf from the dam soon after birth. However, as Lund (2006) suggests, organic agriculture may define animal welfare in terms of 'natural living', perhaps resulting in a desire to let the calf remain with its mother for longer than the non-organic norm. Additionally, differences may occur in the feeding of liquid feeds once calves have been removed from their dams. Dairy calves on non-organic farms are often fed non-saleable milk from cows being treated for disease, which may or may not contain antibiotic residues (Langford *et al.* 2003). Organic farming regulations within the EU do not ban antibiotics for treatment of sick animals, but the use of chemically synthesised drugs is discouraged by imposing longer milk withdrawal times (CEC, 2004). In addition, organic principles of 'natural production' may also lessen the use of chemically synthesised drugs. Therefore organic dairy calves might be less exposed to waste milk containing antibiotic residues than are non-organic calves.

This paper aims to describe the management practices of calving and calf husbandry from neonatal to weaning on organic and non-organic dairy farms in the UK, in an attempt to discuss possible calf welfare differences on the two farm types.

Materials and methods

Recruitment and herd selection

Organic and non-organic farms (n=80) were recruited from dairy herds throughout the UK mainland. Recruitment methods differed between farm types. Organic farms were recruited from member lists of organic producer groups and certifiers. The farms had to be certified as organic for at least two years. Non-organic farms were recruited via SAC dairy consultants and a dairy consultancy firm. All farms had to fulfil the following criteria: they had to undergo regular milk recording; the majority of the herd had to be Holstein/Friesian; and the lactating animals had to have access grazing over the summer. Organic and

non-organic farms were paired on a number of housing, herd size, production, and location criteria. Farms were visited between September 2004 and May 2006. All farms were visited twice. During these visits the face-to-face farmer questionnaire was carried out. Once all farms were recruited to the study a postal questionnaire was sent to each farmer. On a subset of 20 pairs of farms, a further visit was undertaken during winter housing, and during this visit body condition scores of the dry cows were carried out.

Questionnaires
The questionnaires were developed with the assistance of a statistician and tested after consulting a panel of dairy industry experts. The face-to-face questionnaire contained 144 questions in total, of which 41 were directly relating to calving practises and neonatal calf management. Reference was made to the farms records where possible. The postal questionnaire consisted of 38 questions, 16 of which related to calf housing, health, and feeding routines.

Body Condition Scoring
A total of 589 close-to-calving dry cows and heifers were condition scored on 32 farms (16 organic and 16 non-organic). A five-point body condition score was used, ranging from 1 (very thin) to 5 (very fat). Scores could be made on the quarter points of this range.

Statistical analyses
Data were tested for normality, and continuous variables that were not normal were transformed using a log function. Mixed models were used to investigate differences in continuous variables between organic and non-organic farms. General linear mixed models with the binomial distribution were used to analyse discrete variables, with farm type as a fixed effect and pair as a random effect. Back transformed means are presented. All data were analysed in Genstat Release 8.1 (Lawes Agricultural Trust, 2005).

Results

Questionnaire return rates
All 80 farmers completed the face-to-face questionnaire with the interviewers; 51 postal questionnaires (26 organic: 25 non-organic) were received out of the 80 sent, resulting in a 64% return rate.

Body condition scores
The range for scores given across all the farms was between 1.5 and 4. For close-to-calving cattle, a score of 2.5 or less is considered 'thin'. The mean number of cows scored as thin on all farms was 29 ± 2.4%; however this ranged from 0 to 67% of the dry cows across all herds. There were no significant differences in the prevalence of 'thin' dry cows on organic and non-organic farms (Wald = 0.98, P>0.05).

Calving practices
Organic heifers were first served and first calved down at an older age than non-organic heifers (Table 1). However, there were no differences in older cow calving intervals (P>0.05) or number of services to conception (P>0.05) between farm types. Organic cows were moved to the calving area earlier than cows on non-organic farms. Organic farmers stated that they assisted calving less often than non-organic farmers.

Neonatal management
There were no statistical differences between farm types in the calf age at separation from the dam (Wald = 1.2, P>0.05). The average age of the calf at separation was 30 ± 12h. However, organic farms had a larger range of ages of separation (0.5 - 90d) compared with non-organic farms (0.25 – 5d). Four of the organic farms had a system of late separation, where calves remained with their dams within the milking herd.

Table 1. Calving practices on organic (n=40) and non-organic (n=40) dairy farms (back transformed means ± s.e.). All of the information was based on farmer estimates given during a face-to-face questionnaire, except where indicated.

	NON-ORGANIC		ORGANIC		Wald stat	P-value
Age maiden heifers first mated (months)	15.1	0.8	16.4	1.4	4.34	<0.05
Age heifers first calve (months)[a]	25	1.5	27.3	2.2	5.00	<0.05
Average calving interval (d)[a]	410	16	407	12	0.64	NS
No of services to conception [a]	2.0	0.26	1.9	0.25	0.52	NS
How long in calving area pre-calving (d)	1	0.5	2	1.6	3.65	<0.05
Assistance in calving (%)[b]	17.8	5.9	11	5.2	3.99	<0.05

a Data from milk records

b Health records referenced where possible

Calf husbandry

Calf housing was similar across farm types, with 92% of all calves being housed inside. Of these, 50% were group housed, 33% single housed, and 10% pair housed from birth. The most common group size was five calves. All housed calves were bedded on straw. Most (74%) calf housing was cleaned or re-bedded daily, with some farmers claiming to clean or re-bed twice daily, up to once every five days. Only organic farms housed their calves in the same building (and/or fields) as the milking herd, non-organic farms always kept calves and the milking herd separate.

There were no farm-type differences in the delivery method of liquid feed. Plain buckets were used to feed liquids to 45% of calves across farm types, 50% of calves were fed using either teat buckets or a 'whydale' type feeder. The remaining 5% were fed either on a computer-controlled feeder or suckled from cows. Organic and non-organic farmers did differ in the type of liquid feed they offered to calves (Table 2). Organic farmers did not use colostrum replacers (used on 15% of non-organic farms) and did not use milk replacers to feed calves compared with 40% of non-organic farmers. Organic farmers weaned their calves later and there was a tendency for more of them to wean gradually than non-organic farmers.

Table 2. Calf feeding on organic (n=26) and non-organic (n=25) dairy farms (back transformed means ± s.e.). All of the information was based on farmer estimates given on a postal questionnaire.

	NON-ORGANIC		ORGANIC		Wald stat	P-value
Regularly feed waste milk from cows with high SCC or mastitis	17 farms	n/a	21 farms	n/a	4.05	<0.05
Waste milk contains antibiotic residue (%)	95	5	30	15	10.37	<0.01
Age calves weaned from milk/milk replacer (weeks)	7	1.5	12	3	7.78	<0.01
Wean calves gradually over more than 2 days	15 farms	n/a	21 farms	n/a	2.89	0.08

There were no farm-type differences in the age that calves were provided solid food. Calves were given access to forage at 7 d (ranging from 1 d to 84 d across all farms). On average, access to concentrate was at 7 d (1 d to 42 d across all farms). Most concentrates were barley- or wheat-based, with an average crude protein of 18% (range 13 to 19%).

Non-organic farmers tended to be more likely to give a routine treatment to all calves (Wald = 2.32, P=0.05) than organic farmers. Treatments given were extremely variable across farm types. There was no

difference in the farmers' perception of pre-weaning calf mortality (on average perceived to be 1.9 ± 0.3% across all farms).

Discussion and conclusion

Organic and non-organic farms did not differ widely in management and practices used on farms (Langford *et* al. 2008). However, there were some differences between organic and non-organic farms both in the pre-natal management of cattle and the post-natal management of the calves. Close-to-dry cattle on both organic and non-organic farms had similar body condition scores, suggesting that organic feeds were not having a detrimental effect on cow metabolism prior to calving (Domecq *et al.* 1997). Mating and therefore calving at an older age as practiced for organic heifers may help to reduce the number of births requiring assistance seen on organic farms compared with their non-organic counterparts (Mee, 2008). Generally there was more variation among the organic farms, whereas the non-organic farms were more uniform. This is illustrated by the time to separation of calf from dam: non-organic calves were removed within a range of 4.75d, whereas organic calves had separation times ranging from 12h to 90d. A minority of the organic farms were running their calves within the milking herd, allowing the full range of 'natural' maternal and calf behaviours. These regimes potentially have welfare benefits in increasing the length of the cow-calf relationship. However, studies have shown that 'late' separation of dam and calf results in more stress during and after separation than very early separation, as bonds have become firmly established (Flower and Weary, 2003)

The main areas in post-natal calf husbandry in which farms differed by organic status were liquid feeding practices, milk replacer use, feeding milk containing antibiotics, and the age at weaning from liquid feed. Organic farmers were more likely to feed their calves on milk, as opposed to milk replacers, and this was most commonly waste milk. As was expected, the waste milk fed to non-organic calves contained antibiotic residues. However, the antibiotic level in waste milk on organic farms varied by farm policy on chemically synthesised drugs. Some organic calves would receive milk containing antibiotics on a regular basis, while for calves on farms where antibiotics were never used the waste milk would not contain any residues; others were exposed to antibiotics on an irregular basis. On farms in the USA, Sato *et al.* (2005) found organic calves that had little or no exposure to antibiotic residues had faecal bacteria with a lower prevalence of resistance to seven antimicrobials than non-organic calves. However, irregular exposure of calves to antibiotic residues may promote conditions for antibiotic resistance to occur (Langford *et al.* 2003). Later weaning of calves from liquid foods as practised by organic farmers might confer a welfare benefit, as later weaning may reduce the growth check seen after early weaning (Ito *et al.* 2006), especially if carried out gradually (Budzynska and Weary, 2008).

Caution should be used in drawing strong conclusions from the postal questionnaire data, especially with regard to the farmers perception of pre-weaning mortality, as these answers may be underestimated by the farmers (Ortiz-Pelaez *et al*. 2008).

In conclusion, there were few differences between organic and non-organic farmers in calving practices and calf husbandry, farms varied within type, and there was considerable overlap between groups. However, age at first calving and prolonged milk feeding of calves as seen on organic farms may be beneficial for calf welfare.

Acknowledgements

We would like to thank Defra for providing funding for this project and all of the farmers involved.

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Veterinary views on calf welfare in organic milk production in Norway – preliminary results from a survey

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Abstract

Using an Internet-based questionnaire, we asked 180 veterinarians about their views on calf welfare in organic milk production. The respondents were highly experienced, 73% having worked for at least 10 years in dairy practice. However, only 24% had personal experience with three or more organic farms. Those having fewer organic herds in their practice area admitted haviing limited knowledge of the organic standards. Norwegian veterinarians consider the welfare and health situation for calves to be quite similar in organic and conventional milk production. Given nine alternatives, they considered that 'calf kept together with cow' as the most important welfare factor in organic herds, and 'good close environment' as the least important. Given a choice among eight critical points, veterinarians with experience on organic farms chose those that expressed concern regarding insufficient feeding and hygiene. Some veterinarians questioned the welfare benefit of keeping cow and calf together for three days after birth, which is a requirement in organic dairy farming in Norway. The survey has been helpful in identifying areas to be included in welfare assessments.

Introduction

Veterinarians are the outside professionals who most often visit farms, and thus may have valuable information on critical points regarding calf health and welfare in organic milk production. This information is important when designing relevant welfare assessment protocols as a basis for advisory work. However, veterinarians are often accused of having little knowledge of organic farming and have a reputation for being sceptical about animal welfare in organic husbandry. We therefore wanted to ask them about their experiences and views and to make sure to include their critical points in the welfare assessment.

Material and method

We contacted the Norwegian Veterinary Association, to which about 90% of Norwegian veterinarians belong. In January 2008, an Internet survey (Quest back) was sent by e-mail to 400 veterinarians who were members of the Group for Farm Animal Practice and were registered with an e-mail address. The questionnaire covered 17 themes with a total of 50 questions. The veterinarians were asked about their experience with dairy farming in general and organic dairy farms in particular; their familiarity with the organic standards; their views on various aspects of calf welfare and health on organic farms; and their views on the benefits and critical points. A total of 207 (52%) veterinarians responded. Those lacking clinical experience on dairy farms during the past five years were excluded. The remaining 180 veterinarians who were included in the study consisted of 63% males and 37% females, and they were generally very experienced: 73% had at least 10 years of clinical experience with dairy farms and 50% had more than 20 years. A large majority (76%) of the veterinarians had personal experience with fewer than three organic dairy farms, 21% had experience with 3 to 10, and only 3% with more than 10. The group that had experience with three or more organic farms (group E) differed only slightly from those with experience on fewer organic farms (group LE) regarding gender or years of practice; 60% of the LE group were male, and 71% had more than 10 years of cattle practice, compared with 75% males and 77% having more than 10 years in cattle practice in the E group. Answers from the 24% (44) more experienced

veterinarians differed somewhat from the others; because the opinion of these were considered more relevant, the results from this group are in some instances treated separately from the 76% (136) less-experienced veterinarians.

Results

Comparison of organic and conventional

The respondents were asked to compare organic and conventional farms regarding the calves' physical health, well-being, confidence in humans, feed (roughage) quality, feeding routines, hygiene, and space allowance. Results from the E group are shown in Figure 1. Regarding the first seven aspects, by far the most frequent answer (61-70%) was that conventional and organic farms do **not** differ; the less frequent answers were distributed nearly equally on both sides. When it came to space allowance, the most frequent answer (50%) again was that there is no difference, but another 41% answered that organic calves have more space.

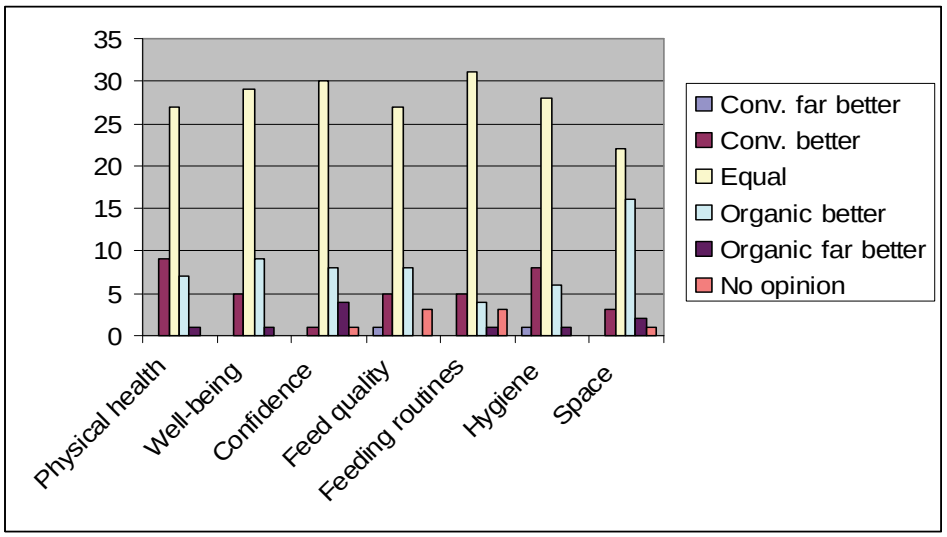

Figure 1. Comparison of experienced veterinarians' view of conventional and organic farms regarding seven welfare factors for calves (x-axis). Number of answers = y-axis.

Acquaintance with current legislation for organic farms

The average veterinarian admitted to have limited knowledge of the Norwegian organic standards (Debio) for cattle. Not surprisingly, veterinarians having more organic farms in their practice area scored better than those having fewer organic farms. On the question 'How well do you know the Debio standards?', on a scale from 1 to 6, where 1 represented not at all and 6 very well, the LE group scored on average 2.07, whereas the E group scored 3.84 (Figure 2). More veterinarians were familiar with the standards concerning medicine use: the LE group scored 2.65 and the E group 4.50.

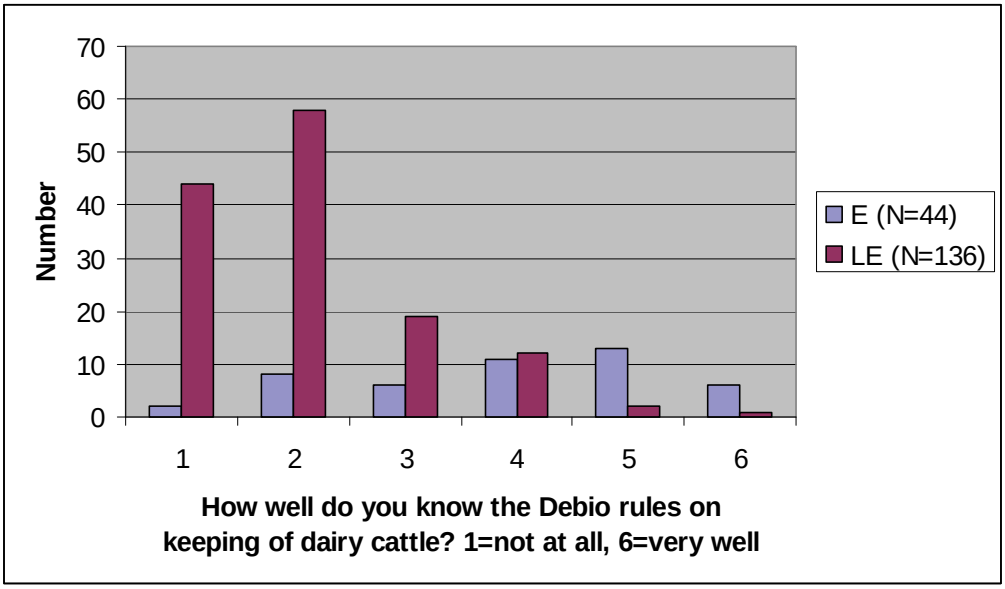

Figure 2. Answers from vets with experience with fewer than three organic farms (LE) compared with vets with more organic farms (E), showing that vets with few organic herds are not familiar with the organic (Debio) standards.

Health condition – organic calves

The veterinarians were asked their opinion of various health variables on a scale from 1 to 6, where 1 is very poor and 6 is very good. Table 1 shows the answers from the E group. The midpoint of the scale is 3.50; the average value of few variables differed much from that. Body condition and growth got the lowest score.

Table 1. Veterinarians' (Experienced group, N=44) opinion of health factors / health situation for organic calves, on a scale from 1 to 6, where 1=very poor and 6=very good.

	Mean	SD	Median
Cleanliness, dryness	3.56	0.87	3
Integumentum (alopecia, wounds, irritation, ectoparasites	3.47	1.00	3
Digestive disorders, diarrhoea	3.59	0.94	3.5
Respiratory diseases	3.77	0.88	4
Umbilical infections	3.73	1.05	4
Arthritis	3.64	0.96	4
Deficiencies, malnutrition	3.65	0.99	3
Body condition and growth	3.30	1.05	3
Mortality < 4 weeks of age	4.14	1.11	4
Treatment when ill or injured	3.86	1.39	3.5
Health recordings	3.31	1.52	3

Important welfare factors

The veterinarians were asked to rank the four most important welfare factors that in their opinion are characteristic for calves on organic farms, given nine choices. In Table 2, the results are given as percentage of answers separately for the E and the LE group and indicating their first and second

priorities. In both groups 'Calf kept together with cow' was scored as the most important welfare factor, and 'Good close environment' as the least important.

Table 2. Ranking of welfare factors in organic dairy farms, among veterinarians with more (E) or less (LE) experience with organic farms.

	Most important welfare factor		Second most important welfare factor	
	E vets (%)	LE vets (%)	E vets (%)	LE vets (%)
Calf kept together with cow	44	48	11	13
Social contact with conspecifics	15	4	16	13
Space allowance	8	8	21	13
Use of straw / soft bedding	0	5	11	11
Care / stockmanship	10	18	11	15
Good feeding routines	5	2	8	8
Low disease rate	3	2	5	6
A more natural life	15	10	13	14
Good close environment (in general)	0	2	5	6

Critical points

The veterinarians were asked to rank eight suggested critical points in calf management. The E veterinarians were mainly concerned about feeding and hygiene, whereas the LE vets mostly worried that calves do not get proper treatment when ill. The results are presented in Table 3, as percentage of answers.

Table 3. Ranking of critical points in organic calf management given by veterinarians with more experience (E) and less (LE) experience with organic farms.

	Most important critical point		Second most important critical point	
	E vets (%)	LE vets (%)	E vets (%)	LE vets (%)
Generally bad hygiene	20	9	18	16
Lack of sufficient care	13	16	5	15
Diseases	3	3	3	2
Diseases not treated properly	10	31	16	25
Insufficient feeding	30	15	21	16
Competition among calves	10	1	11	4
Dirty calves	5	1	13	7
'Alternative' treatments (by non-veterinarians)	10	22	13	15

The veterinarians were invited to comment on other critical points in organic calf management. Among the comments were:

- Organic farmers have too much confidence in nature; the calves do not get enough colostrums
- The welfare is worse when cow and calf are separated after 3-5 days than at birth (a Debio standard requires that cow and calf be kept together for at least three days following birth)
- Stockmanship is a more critical factor in organic than conventional herds
- The welfare situation is not better in organic herds
- Solid floor (a Debio requirement) causes wet calves
- Malnutrition is not uncommon

Discussion

The survey shows that a large majority of Norwegian veterinarians working in large animal practice have fewer than three organic dairy farms in their practice area. This is not unexpected, considering that only 1.7% of the milk produced in Norway is organic (2007). Unfortunately, we did not give respondents the possibility of answering that they had experience with no organic dairy farms, so we do not know the number having none compared with one or two farms in their area. Estimated from the respondents giving a note on this and the portion routinely answering 'don't know', this could be 30-50% of the LE group. The low number of organic farms per district is probably the reason that vets have limited knowledge of organic standards for dairy production. A practical implication of this is that these vets are less able to give relevant advice to organic farmers regarding welfare and health actions. However, even the E group has a relatively low score, especially regarding the Debio standards on how the animals are to be kept. This may reflect the traditional veterinary practice, where treatment of diseases and medication of individual animals have been more of a focus than preventative medicine, including animal behaviour and advisory work on welfare. We would expect this focus to change as younger veterinarians replace the older ones. Nevertheless, veterinarians who want to be involved in advisory work need to update themselves on the special regulations for organic farms.

The E group ranked the welfare factors related to social contact (calf–cow, calf–conspecifics) as very important. The LE group also ranked calf-cow contact as most important, but showed more confidence in good care/stockmanship care than did the veterinarians with more experience with organic farms. Another interesting difference was found in the veterinarians' views on critical factors. The E group was concerned about insufficient feeding of calves, which is consistent with the fact that body condition and growth received the lowest health condition score. The LE group was highly concerned about improper treatment of disease and non-veterinary treatment. The LE group also expressed concern about lack of attention to calves, at the same time as they ranked good care/stockmanship as an important welfare factor. This contradiction may be explained if the respondents interpreted the questions about welfare factors to be general and not reflecting the actual situation on the organic dairy farms in their district.

The veterinarians' views have provided useful information in the process of designing a welfare assessment scheme for organic calves, ensuring that all critical factors get included in the scheme and thus assessed on the farm.

Acknowledgements

We want to thank Ellef Blakstad and the Norwegian Veterinary Association for kind help with the Questback questionnaire and for access to the e-mail list of large animal practitioners.

Part C. Welfare planning in organic calf herds – principles, needs and experiences

Animal Health and Welfare Planning Principles and Experiences from the United Kingdom

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Summary

In the UK, animal health planning is increasingly being promoted and implemented in both the organic and conventional livestock sectors; it is compulsory for organic certification in the UK. Experiences in the UK are valuable for developing animal health and welfare planning on a European-wide basis. In this paper, an analysis of the key principles of health and welfare plans and planning is presented, identified from reviews of British Government, industry quality assurance and organic certification body documents and to a lesser extent European animal health and welfare planning activities. These principles are then compared with those derived at the first ANIPLAN Workshop held in Denmark in October 2007. A review of attitudes towards health and welfare planning is presented and shortcomings of the 'UK style' of health planning identified so that conclusions can be drawn as to how best to take effective animal health and welfare planning forward into European partner countries via the ANIPLAN project.

Introduction

The process of animal health and welfare planning has been described in numerous ways. Defra (2004) define farm health planning as a pro-active approach to positive health that incorporates animal disease prevention and control. The definition of health proposed by the World Health Organisation in 1946 for human populations comprehensively identifies all aspects of positive health (Hovi et al, 2004) and applies equally well to animals: 'Health is a state of complete physical, mental and social well-being, not merely the absence of disease or infirmity' (WHO, 1946). The Soil Association (Pye-Smith, 2003), National Dairy Farm Assured Scheme (NDFAS) (NDFAS, no date), and Assured British Meat (ABM) (ABM, 2008) (the latter two being quality assurance schemes) all state that health planning is a written strategy of preventative healthcare. NDFAS and ABM go further by stating that health planning is also a recording system to monitor herd health and welfare.

Materials and methods

An analysis was undertaken of the various organisations (governments, quality assurance bodies, organic certification bodies) in the UK, and to a lesser extent Europe, that promote the principles of animal health and welfare planning as being integral to good livestock management. The principles were identified from websites, published documents, and quality assurance and organic certification regulations.

Results

It is clear that there is considerable variation among sets of health and welfare planning principles from the organisations studied and that the organic and conventional principles do differ in their emphasis (Table 1). Of key concern, however, is the lack of reference in some sets of principles, particularly the organic ones, to fundamental issues in health and welfare planning, for example the analysis and review of health and welfare data to gauge the situation over time and the importance of biosecurity for disease prevention.

ANIPLAN partners identified the following principles (Vaarst and Roderick, 2008) as essential for effective animal health and welfare planning:

- Continuous development and improvement
    - Identify current status and risks (using animal- and resource-based variables)
    - Evaluation and target setting
    - Promotive, preventative and responsive strategies and action
    - Review
- Farm specific
- Farmer ownership (setting targets, accounting for aspirations, setting planning agendas)
- External person(s) should be involved (to provide unbiased advice/support)
- External knowledge
- Within framework of organic principles (systems approach)
- Written documentation
- Acknowledge existing positive aspects of health and welfare also

The principles identified by the ANIPLAN partners will form the foundation of any health and welfare planning that is developed in this project. Defining a set of principles on which to base health and welfare planning rather than developing a set health and welfare planning template means that ANIPLAN partners all have a common understanding of what is meant by animal health and welfare planning in the project, but have the flexibility to adapt the health planning process to suit an individual country's conditions and specific requirements.

Table 2. Key principles of animal health and welfare planning identified from a total of 15 bodies that have requirements for animal health and welfare planning (five of which were organic specific [four UK and one Swiss])

Principle	Frequency (out of 15 sets of health planning principles, including organic)	Frequency (out of five UK organic certification bodies)
Identification of current disease status and potential risks	10	4
Evaluation of current situation/risks (also prioritisation in some cases)	5	1
Developing strategies to deal with current situation or to prevent potential disease problems	10	4
Biosecurity and mitigation of risk	4	0
Monitoring through data recording	8	3
Analysis and or review of collected data	7	2
Veterinary involvement a requirement or recommended	5	3
Aim to reduce the use of veterinary medicine (or encourage the use of alternative therapies)	5	4
Explicitly address animal welfare	3	0
Describe the use of veterinary medicines and treatments	6	2
Encourage use of preventative management and husbandry	6	3
Describe routine husbandry practices.	2	0
Preventative medicine use (including vaccinations)	2	0
Must be available to all staff who work with the livestock	2	1

Discussion and conclusion

Attitudes towards health and welfare planning differ between farmers and industry bodies and a very clear distinction is apparent, especially in the farming community, between health and welfare planning versus health plans (National Sheep Association, 2006). Farmers feel that written health plans are of limited benefit to them but recognise that they do satisfy the requirements of government and industry bodies (e.g. for cross compliance, organic certification, and quality assurance). This means that the actual health planning process carried out on farms varies significantly and consequently so does the effectiveness of health plans as a tool for improving animal health and welfare. Other shortcomings identified in the UK system of health and welfare planning include: plans that often are written but not effectively implemented; lack of analysis and review of collected health and welfare data; a lack of quality control in health planning systems; and a lack of auditing to see if the health and welfare planning has been effectively implemented on the farm.

Given these findings, there are several issues that need to be kept in mind when developing health and welfare plans and planning in other European countries:

- There are useful health and welfare planning principles from the conventional sector that should be applied to the organic sector;
- The distinction needs to be made between health and welfare planning versus health and welfare plans;
- In order to ensure widespread farmer uptake of the health and welfare planning process, alternatives to written, formalised health plans need to be identified;
- Written health plans are a necessity for quality assurance and organic certification ; where they are being used, quality control and auditing measures need to be put in place to ensure they are fulfilling their requirements;
- Benchmarking health and welfare data may be a useful way of encouraging farmers to plan their health and welfare management strategies by indicating how they are performing in comparison to their peers.

Acknowledgements

The author gratefully acknowledges the financial support for this study provided by the members of the CORE Organic Funding Body Network, being former partners of the FP6 ERA-NET project, CORE Organic (Co-ordination of European Transnational Research in Organic Food and Farming).

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Calf health and welfare planning: How to use the concept developed in the project 'Minimising medicine use through animal health and welfare planning in organic dairy herds' (ANIPLAN)

Mette Vaarst, Faculty of Agricultural Sciences, University of Aarhus, Denmark

What is the concept of animal health and welfare planning in ANIPLAN?

Good animal health and welfare is an explicit goal of organic livestock farming. It is a goal that leads to continuous development and a farm-specific approach. A European project with participants from seven countries (Austria, Switzerland, UK (England and Wales), Norway, The Netherlands, Germany, and Denmark) is currently developing principles for animal health and welfare planning in organic dairy farming. Based on a continuous process, knowledge about the status within a given herd will be used as background for taking decisions and planning future improvements. The process builds on farmer ownership and communication with animal health and welfare professionals (e.g. veterinarians) and/or fellow farmers. The improvements will be systematically evaluated as part of the continuous planning process. The main aim of this European project is to minimise the use of medicines in organic dairy herds through active and well-planned animal health and welfare promotion and disease prevention. This will be met through the following intermediate objectives:

1) Development of animal health and welfare planning principles for organic dairy farms under diverse conditions based on an evaluation of current experiences.
2) Application of animal health and welfare assessment as a dialogue tool.
3) Development of guidelines for communication about animal health and welfare promotion in different settings. This can be part of existing animal health advisory services or farmer groups such as the Danish Stable School system and the Dutch network program.

The participating institutions in this project all have strong on-farm research and development experience and focus, and our common research facilities are the private farms. We aim to combine epidemiological research based on farm data, different qualitative research approaches, and systemic thinking. The research approach basically is oriented towards action research.

Since the principles are developed in a collaboration among partner institutions that all have close contact with the organic farming environment and that come from widely different backgrounds, we hope and expect to develop a concept of animal health and welfare planning that can be implemented in all different types of farming environments, e.g., large-scale dairy farming as well as alpine, smallholder, and diversified farming systems.

Our common starting point is that health planning should aim at continuous development and improvement, and should incorporate health promotion and disease handling, based on a strategy including

- current status + risks (animal-based + resource-based variables)
- evaluation
- action
- review

Also, it should

- be farm-specific
- emphasise farmer ownership, meaning that the farmer is encouraged to take responsibility for his/her planning process
- involve external person(s)
- make use of external knowledge (knowledge from advisors or fellow farmers)
- be based on organic principles (systems approach)
- be written
- acknowledge good aspects, meaning not only focusing at the negative sides

The special case of organic calves

This concept of animal health and welfare planning builds on and emphasises farmer ownership [SEE ABOVE], a farm-specific approach, and the fact that the organic principles form the framework for the planning. This also means that a systems approach should be taken: the planning related to calves and the calf herd should, so to speak, be 'thought into' the whole system. Therefore, it does not seem logical to think of a separation of planning that deals with the calf herd separately from all other planning on the farm. Farmer ownership is crucial in this planning, and when the farmer focuses on specific problems or challenges in the calf herd, this should of course be the focus area of the planning, and include the farm context and the system approach in any relevant manner.

Nevertheless, it is worth considering the characteristics of the organic calf herd and the lives of organic calves that may make it relevant to view the calves as a special case that should be approached in a special way in the animal health and welfare planning process. The following points may be raised and considered as open questions:

- The calves often are especially vulnerable. They are susceptible to many diseases, and they react quickly and sometimes dramatically to changes in their surroundings and management. Therefore, immediate action often is needed when one observes something that could develop into a crisis in the calf herd.
- The organic calf – in contrast to the calf in a conventional herd – will always be group-housed, and typically has to stay with its mother during at least the first day after birth. They will graze from an early age and often will have access to outdoor areas. All these things present special challenges that not all advisors are used to. This emphasises the need for farm-specific solutions that the owner can commit him- or herself to; it also emphasises the need to find advisors and sparring partners in the animal health and welfare planning process who understand these challenges and can contribute constructively to solving them.
- There is a high turn-over in the calf herd. For instance, a calf is fed only milk in a 3 month period. This means that positive responses to improvements may be seen quickly, and evaluation is relevant at an earlier stage.
- In some countries where the herds are very large, either the calves are often taken care of by persons employed to do this, or there are changes in the calf herd's staff. This means that special considerations regarding the process of communication, reporting back, follow-up and so forth are needed as a part of the animal health and welfare planning process.

Animal health and welfare planning related to organic dairy calves

Animal health and welfare planning is an active and interactive process involving both the farmer – who clearly should own the process, the challenges, the problems and the solutions (meaning that it should be the farmer who defines and explicitly formulates this) – as well as external persons who act as sparring partners, facilitators and/or experts, based on the farmer's articulated needs and wishes. This is a very strong and important part of the ANIPLAN project, reflecting an evaluation of the experiences from the UK, where many users perceive a big difference between the on-farm presence of an animal health and welfare plan as opposed to the process of animal health and welfare planning (Atkinson and Neale, 2008). The first is viewed by many farmers as a 'document' that they have to have on the farm because the legislation requires it, whilst the latter is a process in which the farmer actively involves him/herself in making a plan for improvements in the herd and implementing it. It is very important to keep building on this when focusing on improvements within the organic dairy herd for better calf health and welfare and dealing with the specific challenges of calves, calf management, and not least the calf managers.

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What do Norwegian organic farmers need and wish for in regard to dairy calf welfare, and what is it possible to accomplish?

Lars Erik Ruud, Norwegian Cattle Health Services, Ås, Norway

The farm situation

Norwegian farms are quite diverse. There are about 14 000 dairy farms in Norway and 5 000 beef farms. The herd size for dairy farms varies from 5 to 150 cows, with 19 cows as the mean. Only 100 farms have more than 50 cows. Norwegian Red is the dominant breed, with 95% of all dairy cows.
The average milk yield is 6 500 kg per year per cow, but there are herds with means of 5 000 kg, as well as herds far above 10 000 kg. This is because of factors such as herd size and the economic-political situation (Norwegian dairy farmers are allocated a milk quota), as well as the geographic situation. In the north at 70° N the pasture season is 2 months, while in the south this season is more like 5 to 6 months.
New buildings are often built for 50 to 70 cows with automatic milking systems (AMS); there are approximately 500 automatic milking units in service in 2008.
Cooperative farms are common in Norway. Today 2 500 dairy herds are cooperatives, usually owned by two to four farmers. These farms produce one-fourth of all milk in Norway today. Approximately 270 dairy farms are organic and 30 are bio-dynamic.

The advisory system

The largest dairy (TINE), slaughterer (Nortura), and breeding company (Geno) are farmer-owned cooperatives. TINE receives more than 90% of the milk and Nortura about 80% of the meat (all species) in Norway. There also are some private dairies and slaughterhouses in Norway with their own limited advisor service.
These companies employ 400 advisors who work with the farmers on topics such as feeding, breeding, housing, and economic performance. Approximately 30 advisors have special competence in organic farming.
The Norwegian Cattle Health Services is a supporting 'umbrella' organisation, helping all the advisors by producing pamphlets, books, and statistical reports, arranging courses, and so forth. The Cattle Health Services also works closely with local veterinarians to coordinate preventative herd health in Norway.

Norwegian Cattle Health Recording System

Norwegian Cattle Health Recording System (NCHRS) is a centralised database owned by farmers through the cooperative organisations mentioned above. Into this database farmers, veterinarians, advisors and the organisations can enter health incidences, inseminations, cow production traits, and more. In this system each animal has its own registration card within each herd. Today it also is possible for farmers to report using the Internet. The database is open for research.

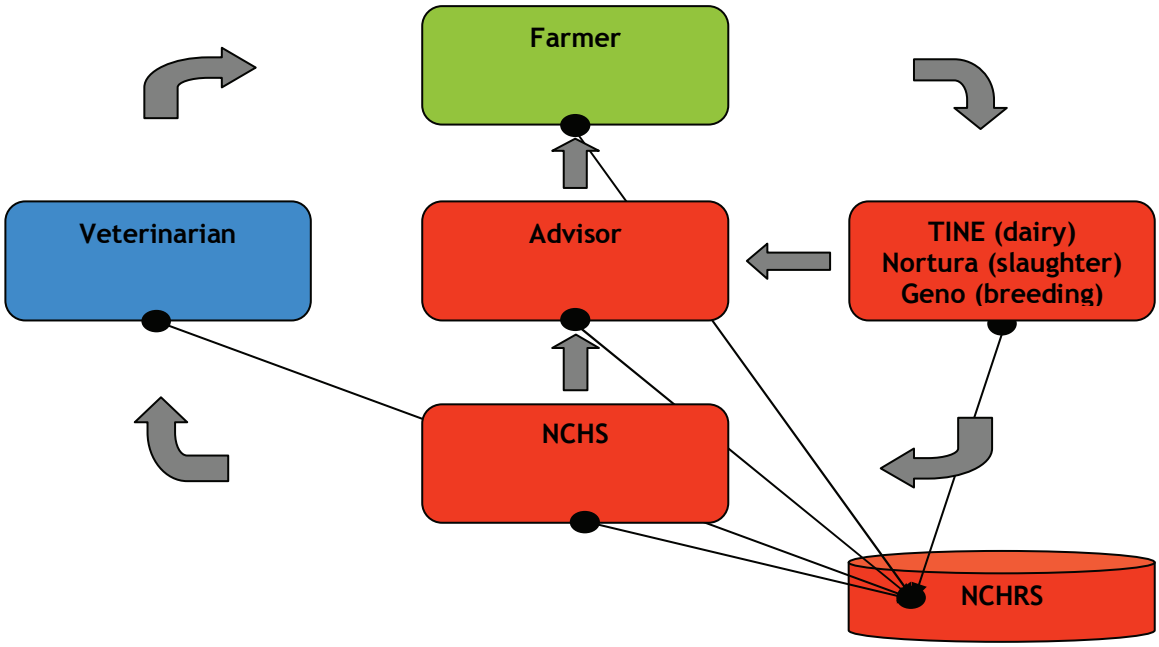

Figure 1. The simplified figure shows how the farmers' advisory system works in Norway.
NCHS = Norwegian Cattle Health Services
NCHRS = Norwegian Cattle Health Recording System, a centralised database owned by the farmers

Organic challenges

The following welfare challenges must be given special attention in relation to Norwegian organic dairy calf production:

- Health problems vs. limited treatment possibilities
  - Will these limitations cause animal welfare problems?
- Quality and amount of food
  - Organic farming usually reduces the yield of grass/roughage. The demand for more area increases. If farm area is a limiting factor, there is a risk of underfeeding.
- Housing in old barns
  - Organic farming means more re-use of resources such as buildings. Old barns are often badly ventilated, small, dark, etc.
- Grouping of calves – calvings spread over time means a spread of ages in the same pen
  - Large groups (more than 8-10) with a wide spread in age are at greater risk regarding calf diseases such as diarrhoea and respiratory diseases.
- Mother – calf, suckling and use of artificial teat
  - Suckling behaviour is maintained as long as milk is given – there is potential for sucking on genitals, the environment, etc.
  - Hygiene may be at stake when using an artificial teat.
  - The Norwegian organic standards demand that the calf stay with its mother during the first three days of life. This establishes a strong bond between mother and calf, which only is to be broken after three days, causing separation distress.
- Milk feeding period: Norwegian organic standards require a three-month milk feeding period compared with the two months usually used in conventional production.
  - Are the calves fed the roughage, concentrates, etc., that they need to become good ruminants?
  - Suckling behaviour is maintained as long as milk is given
- More in need of 'Totality thinking' advice (soil – animal – farmer – consumer), which puts greater demands on the advisors and veterinarians.

2009: Proof of competence

Norwegian legislation demands that starting in 2009, all farmers must have documented knowledge of animal welfare. Farmers who have attended agricultural schools or colleges fulfill this legal requirement. However, about 40% of the farmers will have to acquire this competence; most will probably do it by following a 20-hour course prepared by the Cattle Health Services.
This course consists of two short booklets, a DVD, and a system for assessing welfare on one's own farm. The themes deal with animal welfare in general, the economics of animal welfare, senses, needs, behaviour, legislation, transportation, housing, care-giving, health, 'disaster' prevention, and more.
The assessment scheme is based on critical control points and the farmer's own assessments, and includes the possibility of setting up a plan of action. The main aim of the scheme is not documentation, research, or other things like that; rather, it is intended more to 'awaken' the farmer regarding concerns about animal welfare.
The idea behind the design of the scheme is the traffic light, where:

- Red is illegal or bad
- Yellow is legal, but are improvement needed?
- Green is good or as recommended

For each selected theme the farmer will find the three colours mentioned above with definitions and brief recommendations.
The scheme is available in Norwegian at www.husdyrvelferd.no

Welfare advising

Today there is no specialised advising on animal welfare offered to farmers in Norway, but there has been some early work done to promote this.
The idea today is that:

- Advice in this area must offer some advantages for the farmers, such as economic.
- There must be a two-step tool to save time because the farmer must pay the full cost of this service. Step One should be a screening tool to reveal the work that is needed together with the farmer. Step Two has more specialised tools within defined problem areas.
- The system must be able to be operated by both veterinarians and advisers.
- The farmer must feel that they are working with what concerns them and that the good ideas are actually their own.

The Danish 'stable school' concept is highly interesting in this context (see page XX), and hopefully it can be tried out on Norwegian dairy farms in the near future.

What do Norwegian organic dairy farmers need and wish for, and what is it possible to accomplish? The Norwegian organic movement's view

Sissel Nyhus, Debio, Norway

As a control body, Debio has a lot of contact with organic farmers. During inspections and telephone contact a control body can see some of the challenges, needs, and wishes among the farmers. Debio is often contacted in times of trouble, and the problems we hear about from the farmers often seem more serious than the real situation. The signals picked up from a limited number of farmers are not scientific or statistically correct.

About 45% of the dairy farms inspected by Debio have kept their dairy herds conventional. There are different reasons for not converting the herd to organic farming. The reasons that farmers mention include old dairy barns, more work, expensive feed, and unexpected regulations. The organic dairy herds in Norway are of various sizes and are in different places around the country. Many of the buildings are old but the trend is toward bigger units where several farmers work together. Usually they build a new barn for the milking cows, and some keep their young livestock in the old buildings.

One of the international principles for organic husbandry is ensuring high animal welfare. The regulations for organic farming are a supplement to the general rules.
Some specific regulations for calves:

- Group holding from one week
- Three-months' milk feeding based on natural milk
- Pasturage
- At least half of the total floor area must be solid.
- More space in new buildings, and in old barns from 2011.
- Suckling for three days, teat feeding for at least a month (special for Norway).
- Milk from antibiotic treated cows cannot be used fed sooner than five days after treatment (special for Norway).

Group holding can create problems with some livestock; varied ages, little space, and infections are mentioned. There seem to be fewer problems when calves at the same age are kept together in constant groups. The main problem is economic: building costs for a small herd are too high.

Milk feeding for three months can be time-consuming and expensive. Some organic farmers let their calves suckle their mother or a surrogate mother in this period, and the messages we get from our inspectors are generally positive about this system; they report of big and healthy calves with a shiny coat. Unfortunately some farmers seem to be sparing when it comes to milk feeding, and feed only a small amount of milk (usually 4-6 litres per day), which seems to result in small and weak animals. The dairy advising services recommend giving 6-8 litres of milk per day for the first week, and 5-6 litres of milk and 500 g of concentrate from 2 to 4 weeks. A problem sometimes mentioned is that the organic concentrates are not adjusted for calves, and there is varying knowledge about alternative concentrates among the farmers and advisors. Little milk and little concentrate are a bad combination. The farmers need advice about feed rations for calves adjusted for organic husbandry.

Calves on pasture can be challenging in cases of parasites and in some areas predators. Prevention of parasites is important in organic husbandry. Some farmers need more knowledge about ways to prevent parasites. If treatment is needed, using veterinary medicine is permitted.

Solid floor area is usually in place when a farmer converts to organic husbandry. The most common problem is that there is no downward gradient, which can result in dirty animals. Straw and woodchips are expensive, and some farmers do not use enough. General construction advice and a great amount of straw can reduce environmental problems related to solid floors.

Welfare seems to improve in new buildings with more space and with solutions prepared for calves. In the building process it is important to consider the special needs when raising calves. Appropriate density prevents health problems arising from overstocking, but if a large pen is located in the wrong place, for example a place with a draught, there still can be health problems.

Suckling for the first three days is a debated regulation. How can the farmer ensure that the calf gets enough colostrum? Suckling in this critical period requires an observant farmer. The regulation does not exclude the possibility of giving the calf colostrum from bottle if that is necessary.

The calf's welfare is affected by the environment and the farmer's management. Good management is based on experience and knowledge. Long experience alone can make the farmers go blind regarding their own herds. Earlier, the educational program was less focused on animal behavior and welfare, and some farmers have no agricultural or husbandry education. From 2009 the general regulations will demand proof of animal education. In some regions the advisor services organise courses and stable schools. These are initiatives that can give some farmers a 'welfare-awakening' and motivate them to improve animal welfare. A weakness is that they can be a one-time effort, and many farmers are not covered.

Organic regulations alone are not the same as improved welfare, but in the conversion period the farmer can be motivated to seek information and make accommodations that improve welfare. Organic farmers get at least one physical inspection from a control body every year, which can be motivating for the farmer. In cases where general or organic regulations are not complied with, the consequence can be losing organic certification. The inspectors do registrations, and if there are problem areas they will follow up with letters, unannounced inspections, or in serious cases inspection by the food authority (Mattilsynet).

To improve welfare on organic dairy farms, Debio has tested a checklist for milking cows on several farms during inspections in 2007/ 2008. The list works as a tool for the inspector and farmer. Objective criteria can help the inspector and farmer reach agreement about the actual conditions. Debio is not supposed to give practical advice, but the checklist can identify critical conditions and motivate the farmer to take action. Regular inspections with welfare registrations can be a motivating factor to improve welfare. Inspections based on objective checklists also calibrate the inspectors and help them look for the same criteria. At this time it is too early to conclude anything the welfare effects of the checklist, but there are high expectations for it.

The farmers' needs are varied; among them are knowledge, motivation, and financial returns. Courses, education, and advisory services are constantly improving, and in the long term most likely will improve animal welfare. Increased earnings are a motivating factor as well as a necessity when making accommodations to improve welfare. Hopefully, science and new knowledge will tell us that investing in the calf pays off in the long term. In turn, the motivation for investing in good systems, feed and straw will increase.

Part D. Visit to dairy herds

Presentation of the three farms

Alm Østre farm

Alm farm is a biodynamic cooperative which produces vegetables, cereals, cow milk and meat. There are 54 ha lands in production. Of this is 16 ha grass production and 7 ha pasture. The rest is production of vegetables (carrots and turnip cabbage) and grain (matkorn). The cow barn is a tethering system. They have 19 milking cows per year and about 19 calves and young stock. Milk production is 5500 kg and 6000 kg Energy corrected milk ECM.

Fokhol farm

Fokhol is a **biodynamic farm, Demeter certified.** The farm is situatet in an area with very good conditions for farming. With 96.5 ha arable land is Fokhol one of the largest biodynamic/organic farms in Norway. Since 1990 a diverse production and crop rotation is developed: 36 cattle in a tie stall system for milk and meat, horses for working purposes as a supplement to the tractor-based equipment, grain growing, vegetables, potatoes, hayfields and pastures. At our visit there were 32 dairy cows, 15 0 – 3 months old calves, 5 calves 3-6 months old and 31 other young stock.

Nøttestad farm

The farm is a conventional farm with cubicle housing system. There are 57 ha land in production. Of this, about 20 ha grass production and 5 ha other fodder crops. There are about 50 dairy cows and 60 calves. In total there are about 160 young stocks.

Photo: Silvia Ivemeyer

Part E. Workshop discussion, conclusions and evaluation

Workshop report: The outcome and group work discussions summarised

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Introduction

The workshop 'Calf welfare in organic herds – planning for the future' brought forth two days of interesting presentations mixed with intensive discussions among 31 participants from nine countries. The event also included one morning of study visits to three Norwegian dairy farms representing two different types of calf rearing, and some exercises in practical welfare evaluation in those herds. The event was part of the EU-project 'Minimising medicine use in organic dairy herds through animal health and welfare planning' (ANIPLAN) in the CORE Organic programme, and was financed by the Norwegian Research Council.

The workshop covered three aspects of calf welfare implementation. The first was to ask and discuss the question 'What makes a happy organic calf?' Second, the issue of how to measure and register welfare status on the herd level was addressed. Finally, the important – and often neglected – aspect of how to encourage the farmer to solve problems and improve system weaknesses was discussed in terms of herd welfare plans and welfare planning.

What makes a happy organic calf?

The group work on the first day dealt with identifying the critical welfare points and how to assess them. Participants were divided into four groups discussing areas and critical points to be assessed, as well as practical procedures to be carried out by the auditor when visiting the farm. The first point made was that the purpose of the assessment decides its design – that is, whether the aim is advisory, certification, or some other must influence what to assess and also how. The concept of naturalness and what it means in relation to animal welfare in calf herds was also a matter of discussion in the groups, but no consensus was reached. It was pointed out that providing naturalness as well as good welfare in organic herds demands much more from the farmer than conventional calf rearing.

Animal-based parameters

There was agreement that the focus of the audit should be the individual calf, and that animal-based indicators provide the most accurate information. However, resource-based indicators provide information about risk factors and should therefore be included in the audit. Also, they can more easily be standardised, which means that limits can be set and minimum requirements established. It was suggested that at least ten individuals in each herd be randomly sampled for closer examination. Lesions could be scored on a scale, for example 1-3. Calf weight may also be used, but the question was raised if growth is a valid welfare indicator. Is welfare always at risk with low growth rates; conversely,do high growth rates indicate good welfare? Mortality appears to be a good indicator of the welfare situation in the herd, although on small farms this may not be true, since the death of one calf has a big impact on the percentages accounted for. Sufficient intake of colostrum within a given time period was pointed out as crucial by several groups, and blood sampling of calves was suggested as a way to measure the actual colostrum intake. Of course, a problem with this method is that farms may not have newborn calves at the time of the audit. Instead, one could ask the farmer key questions to find out about the calving routines, for example 'How do you know when the cow calves?'

All groups suggested including registrations of calf behaviour. It was pointed out that it is desirable to include registrations of 'positive welfare' indicators, for example play behaviour. However, this is not easy to capture during a short visit, which is evident from the fact that calves normally spend 70-80% of their time lying down. Several groups suggested using automated measures, such as automatic measuring devices that can register animal movements over a period of time, for example five-days. Such devices

could be used to register play behaviour. However, it was pointed out that it may be difficult to distinguish play behaviour from agonistic behaviour in calves younger than six months.

The human-animal relationship should also be assessed, since animal fearfulness has welfare consequences. However, it was pointed out that animals reared with a high degree of naturalness may receive less human contact and score low in this kind of test. Thus, there may be a dilemma to be dealt with here.

Resource-based variables and farmer interviews

The resource-based variables to be investigated include available space per animal. However, this is not an unambiguous measure, as shown by the Swedish system for allowing space to broiler chickens: flocks with good hygiene and good results regarding health and mortality are allowed a higher animal density, and they still perform well. Also, we do not know whether there is a linear relation between welfare and available space per animal. It was pointed out that the environmental assessment must include hygienic conditions, since these have proven to be crucial for calf welfare.

It was suggested that on-farm registrations be supplemented by a farmer interview, using a questionnaire. This could be organised by topic, and similar questions could be used for each category of animals. Available data from herd health reports, etc., may be analysed before the visit and used as a departure point for the audit. This could also provide a long-term perspective, giving valuable information regarding the welfare situation in previous years. However, it is known that farmers are less careful registering problems with the health or welfare of calves than of cows, so that calf data are less reliable compared with similar registrations for dairy cows.

Auditing and welfare planning

Two hours was suggested as an absolute minimum for a reliable audit. 'If you can't take two hours for an audit, don't do it' was the message from one of the groups. Several groups suggested a two-step procedure, where a quick scan of the herd is followed by a closer look at areas that may have problems. Clear guidelines for the audit must be developed that provide as exact criteria as possible, including measurements and illustrative pictures. The farmer should be contacted on the phone well ahead of time to clarify the purpose of the visit. It was also considered important to have regular contact with the farmer, not only during a yearly audit but preferably several times per year. The audit should be used to make a welfare plan, based not only on the results from the audit but also on the farm's goals. The results should be divided into different categories, depending on the urgency of the measures needed.

Concluding discussion

The last day's concluding discussion gave the following definition of organic calf welfare: **'A happy and healthy calf in a natural environment'**. Having stated this, it is important to include the animal's entire life cycle in the evaluation. The point was made that hygiene and health (in the sense of 'freedom from diseases') are important factors, but not enough to ensure welfare. It is important to find and develop indicators of positive welfare, such as play behaviour. A good human-animal relationship also is crucial for welfare, and good stockmanship is a 'must'. The farmer needs to get the feeling that he or she 'owns' the problems and thus takes full responsibility for solving them. In this process it is important to set goals that the farmer perceives as realistic and attainable.

The group discussions made it evident that there are few simple, easy, and unambiguous measurements to capture animal welfare during a short on-farm assessment. Clearly, more research is needed to evaluate and validate suitable variables and estimate the limits of what is acceptable. More work also is needed to elaborate the concept of naturalness in relation to calf rearing and animal welfare. Still, much knowledge and valuable aspects as well as practical experience were delivered during the workshop. These will be used in the Norwegian project to develop a scheme to assess calf welfare to be used on organic dairy farms, primarily for advisory purpose. This work is part of the ANIPLAN project and will be carried out in collaboration with the Norwegian Herd Health Service.

Part F. Workshop participants

ANIPLAN Calf workshop, 31.03.-01.04.2008 – List of participants

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The National Veterinary Institute has its main laboratory in Oslo, with regional laboratories in Sandnes, Bergen, Trondheim, Harstad og Tromsø, with about 360 employees in total.

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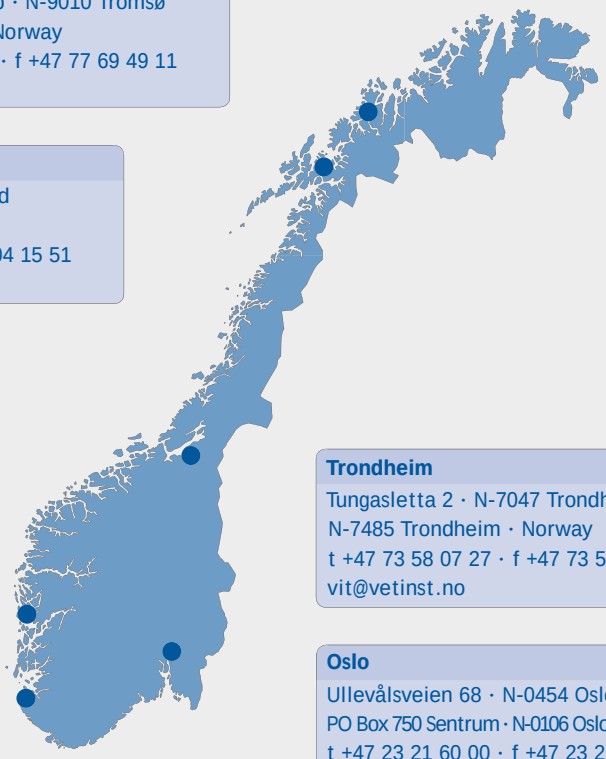

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